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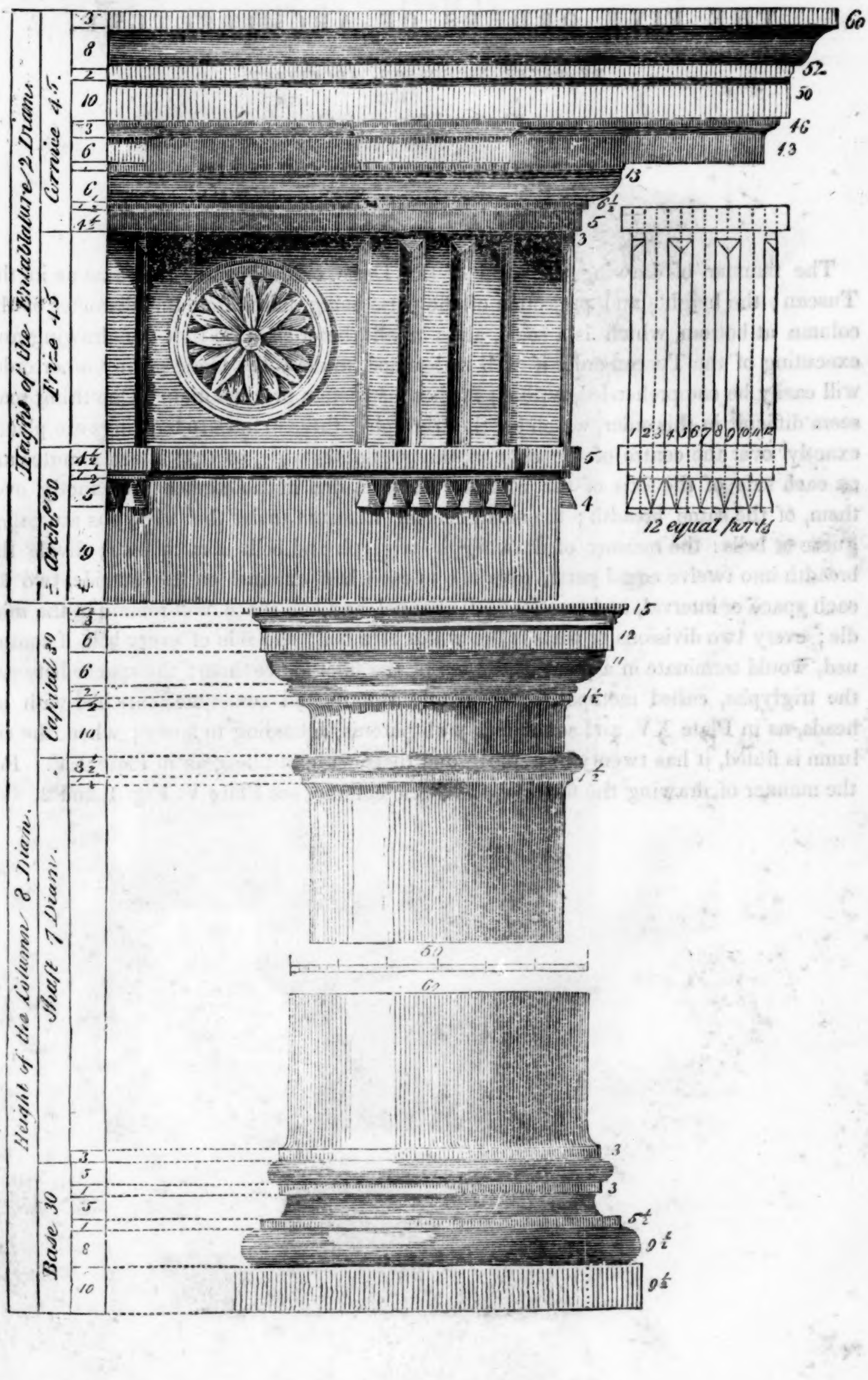


THE STUDENT'S INSTRUCTOR

IN DRAWING AND WORKING

THE FIVE ORDERS OF ARCHITECTURE.

BY PETER NICHOLSON, ARCHITECT.

(Continued from our last.)

OF THE DORIC ORDER.

PLATE XIII.

The manner of drawing the parts of the Doric order is much the same as in the Tuscan; the heights and projection of the parts being taken from the diameter of the column at bottom, which is a scale, alike in all the orders; so that the drawing and executing of the Tuscan order if well understood, to draw the Doric or any other order will easily be comprehended, without further instruction or repetition. One thing may seem difficult in this order, which are the triglyphs; these in modern buildings are placed exactly over the centre of the column, thirty minutes wide, so that fifteen minutes are on each side of the axis of the column: the mutules in the cornice are exactly over them, of the same breadth; the small conical frustrum under the triglyphs are called guttæ or bells: the manner of drawing the triglyph and bells is as follows; divide the breadth into twelve equal parts, give one to each half channel on the outside, two for each space or interval, and two for each channel, and one space will remain in the middle; every two divisions or parts is the width of a bell; the side of every bell, if continued, would terminate in a point at the top of the fillet above them; the spaces between the triglyphs, called metopes, are generally square, and sometimes enriched with o: heads, as in Plate XV. and sometimes with pateras, according to fancy; when the co lumn is fluted, it has twenty in number, and these without fillets, as in Plate XV. Fo the manner of drawing the flutes of the Doric column, see Plate V. Fig. 1 and 2.

GRECIAN DORIC.—TEMPLE OF THESEUS.

***Plate* 14.**

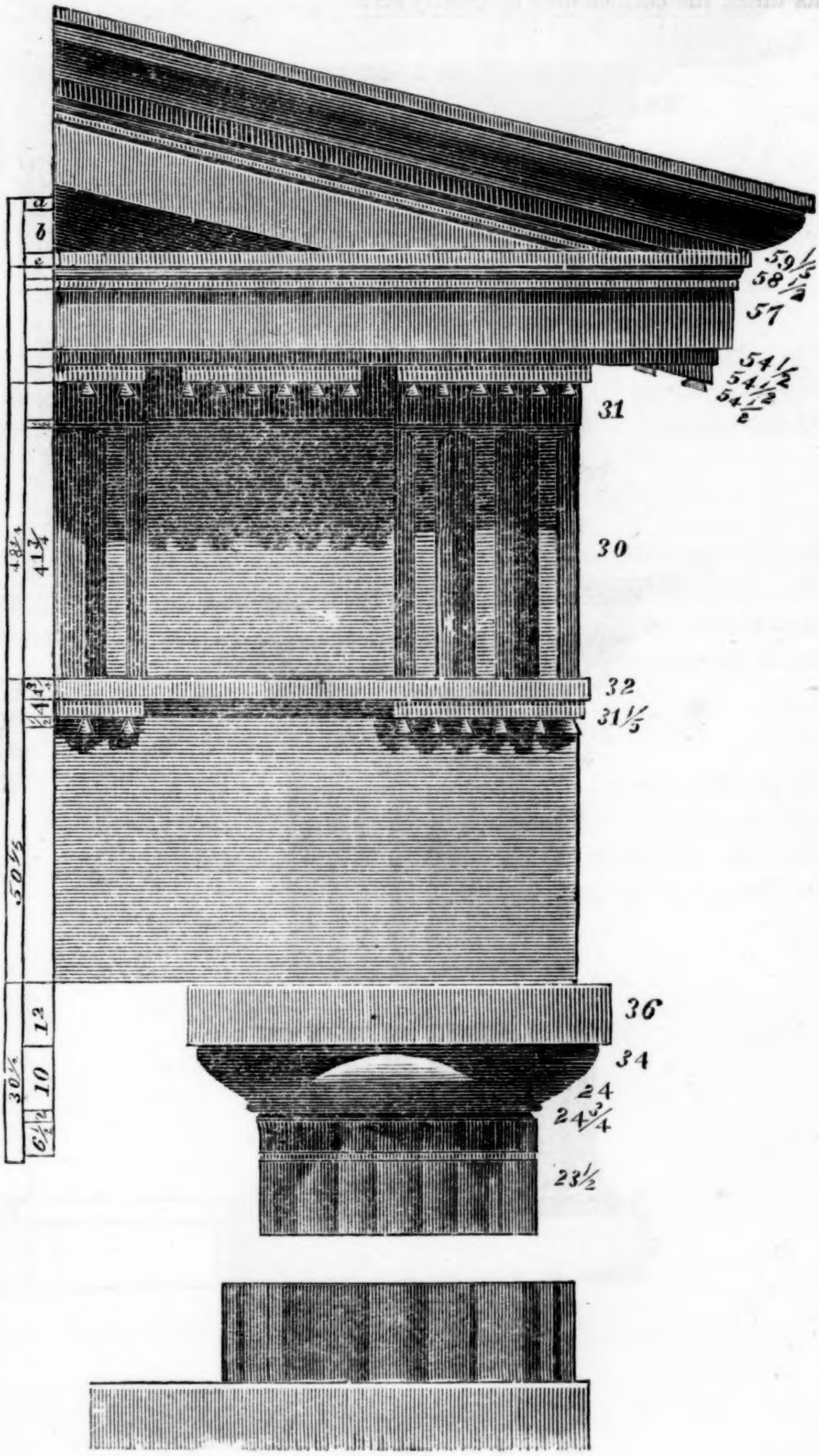
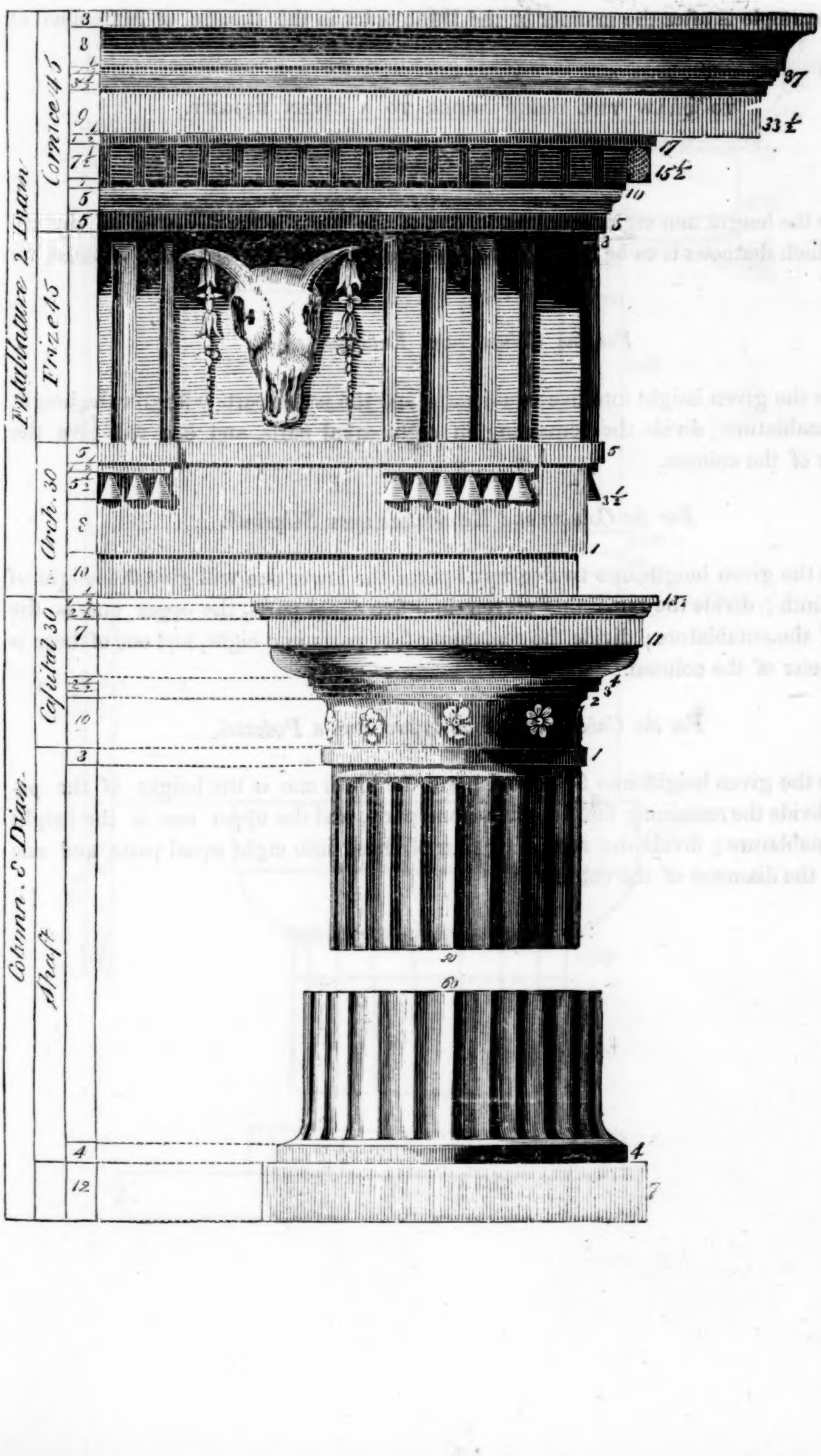


PLATE XIV.

Is a Doric cornice with the planceer inverted, so that the whole of the work and ornaments under the cornice may be clearly seen.

THE DORIC ORDER WITH DENTILS.

Plate 15.



PLTE XV.

Is another example of the Doric order; with dentils in the cornice; and is very proper er for the inside of a building, the column being fluted, and the whole much enriched.

This example is after the manner of the Doric order in the theatre of Marcellus at Rome.

TO DRAW THE DORIC ORDER TO A GIVEN HEIGHT.

For the Column.

Divide the height into eight equal parts, one of the parts is the diameter of the column, which diameter is to be divided into modules and minutes, as before directed, for practic.

For the Column and Entablature.

Divide the given height into five equal parts, and the upper parts will give the height of the entablature; divide the remaining in eight equal parts, and one will give the diameter of the column.

For the Column and Entablature upon Subplinth.

Divide the given height into twelve equal parts, the lower one will give the height of the subplinth; divide the remaining eleven into five equal parts, the upper one is the height of the entablature; divide the remaining four parts into eight, and one of these is the diameter of the column.

For the Column and Entablature upon a Pedestal.

Divide the given height into five equal parts, the lower one is the height of the pedestal; divide the remaining four into five equal parts, and the upper one is the height of the entablature; divide the remaining four of these into eight equal parts, and one will give the diameter of the column.

GRECIAN DORIC.—TEMPLE OF MINERVA.

Plate 16.

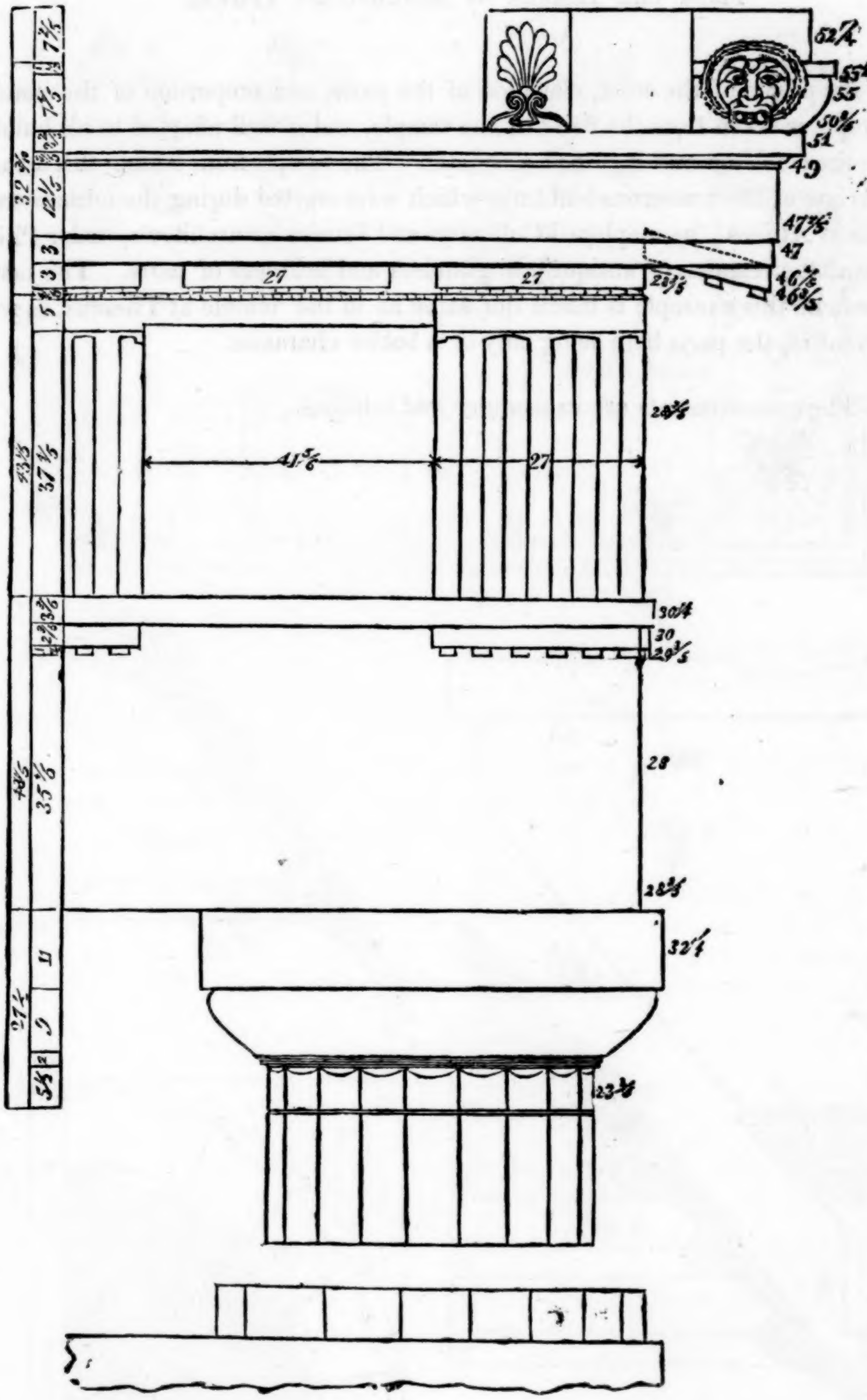


PLATE XVI.

FROM THE TEMPLE OF MINERVA AT ATHENS.

Shows the profile of the order, elevation of the parts, and proportion of the members. This example is taken from the flank of the temple, and is well adapted to all buildings which require a solemn and dignified character. The temple from which this example is taken, is one of the numerous buildings which were erected during the administration of Pericles at Athens; he employed Calicrates and Ictinus as architects, under Phidias. It exceeds all the remains of antiquity in grandeur and boldness of parts. The taste of the members of this example is much the same as in the temple at Theseus, as will be shown hereafter, the parts here being only of a bolder character.

Note.—The measurements are in modules and minutes.

TEMPLE OF MINERVA.

Plate 17.

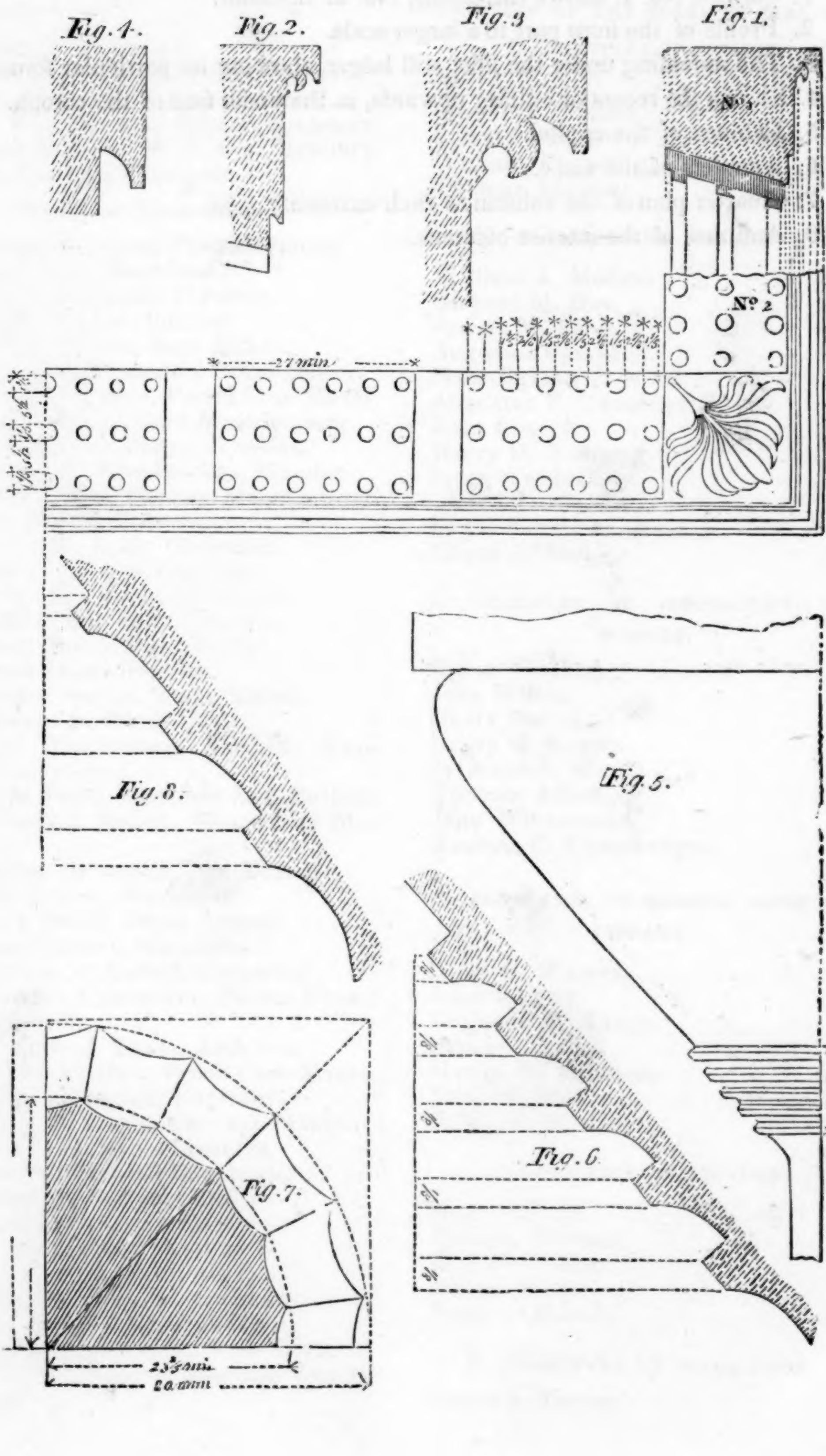


PLATE XVII.

PARTS AT LARGE AND IN DETAIL OF THE PRECEDING EXAMPLE.

Fig. 1. Cornice, No. 1. shows the profile, No. 2. the soffit.
Fig. 2. Profile of the front part to a larger scale.
Fig. 3. The moulding under the fillet still larger, showing its particular form.
Fig. 4. Shows the recess or cutting upwards, in the under face of the corona.
Fig. 5. Echinus of the capital.
Fig. 6. Annulets of the same.
Fig. 7. Quarter plan of the column at each extremity.
Fig. 8. Annulets of the interior columns.

Proceedings of the Institute for April, 1836.

April 11.—*Annual Election of Officers for* 1836–7.

After the meeting was organized, the official canvass of the election was declared, as follows:—

Geo. Bruce, President.
John M. Dodd, 1st Vice President.
Robert Walker, 2d Vice President.
Henry Cunningham, Record. Secretary.
Leonard D. Gale, M. D., Cor. Secretary.
Samuel Carter, Treasurer.

Board of Directors.

1 Uzziah Wenman, Civil Engineer.
2 Adam Hall, Machinist.
3 Thomas Ewbank, Plumber.
4 Joseph Tucker, Builder.
5 Samuel Roome, Sash Maker.
6 Alexander Masterton, Stone Cutter.
7 Thomas Addison, Pencil Case Maker.
8 Caleb Bartlett, Card Manufacturer.
9 Benjamin W. Clapp, Jeweller.
10 Thomas C. Chardavoyne, Plumber.
11 Elisha J. Abel, Cordage Manufacturer.
12 John Windt, Printer.
13 Robert M. Lang, Carpenter.
14 James J. Mapes, Chemist.
15 George N. Miner, Machinist.
16 William Partridge, Chemist.
17 Robert Smith, Stone Cutter.
18 James Stone, Plumber.
19 Edward Smylie, Grate Maker.
20 Sylvanus S. Ward, Hatter.
21 John Whittemore, Machine Card Manufacturer.
22 James Frost, Engineer and Builder.
23 William J. Mullen, Watch Dial Maker.
24 William Browning, Iron Founder.
25 John Conroy, Machinist.
26 Henry Durell, Paper Stainer.
27 Noah S. Hunt, Machinist.
28 Augustus Campbell, Carpenter.
29 Augustus Cammeyer, Picture Frame Maker.
30 Alexander J. Davis, Architect.
31 William H. Hale, Pencil Case Maker.
32 William Everdell, Engraver.
33 Mahlon P. Green, Carriage Maker.
34 Richard M. Hoe, Machinist.
35 Henry G. Stetson, Bookbinder.
36 Ichabod Hoit, Paper Dealer.
37 Benjamin J. Hunt, Hatter.
38 Thomas Afflick, Painter.
39 John Remick, Shoemaker.
40 Jordan L. Mott, Stovemaker.
41 Peter Baxter, Cabinetmaker.
42 Alexander Laurance, Stone Cutter.
43 Owen G. Warren, Machine Draftsman.
44 Henry O. Kearsing, Piano Forte Maker.
45 Peter Walters, Dyer and Embosser.
46 Martin W. Emmons, Brassfounder.
47 John Johnson, Jr., Blacksmith.
48 Lewis Feuchtwanger, Chemist.

Committees of the Board of Directors.

1. Committee of Finance.

George Bruce.
Benjamin J. Hunt.
Edward Smylie.
William Everdell.
Thomas Addison.

2. Committee on Donations.

William J. Mullen.
Richard M. Hoe.
Robert M. Lang.
Augustus Campbell.
Peter Baxter.
Augustus F. Cammeyer.
John Conroy.
Henry O. Kearsing.
Peter Walters.
John Johnson, Jr.
Lewis Feuchtwanger.
Elisha J. Abel.

3. Committee on Instruction and Schools.

Robert Walker.
John Windt.
Henry Durell.
Henry G. Stetson.
Sylvanus S. Ward.
Thomas Afflick.
John Whittemore.
Thomas C. Chardavogne.

4. Committee on Reading Room and Library.

Owen G. Warren.
John Remick.
Benjamin W. Clapp.
Samuel Roome.
Martin W. Emmons.
John M. Dodd.
Henry G. Stetson.

5. Committee on Lectures.

Henry Durell.
Thomas Ewbank.
Wm. Partridge.
Samuel Carter.
Noah S. Hunt.

6. Committee on Publication.

James J. Mapes.

Leonard D. Gale.
Thomas Ewbank.
George N. Miner.
Henry Cunningham.

7. COMMITTEE ON ARTS AND SCIENCES.

George N. Miner.
Adam Hall.
William H. Hale.
James Stone.
James J. Mapes.
Jordan L. Mott.
Alexander J. Davis.
Thomas Ewbank.

DR. URE'S PATENT CORRUGATED SUGAR-PAN OR TEACHE.

Fig. 1.

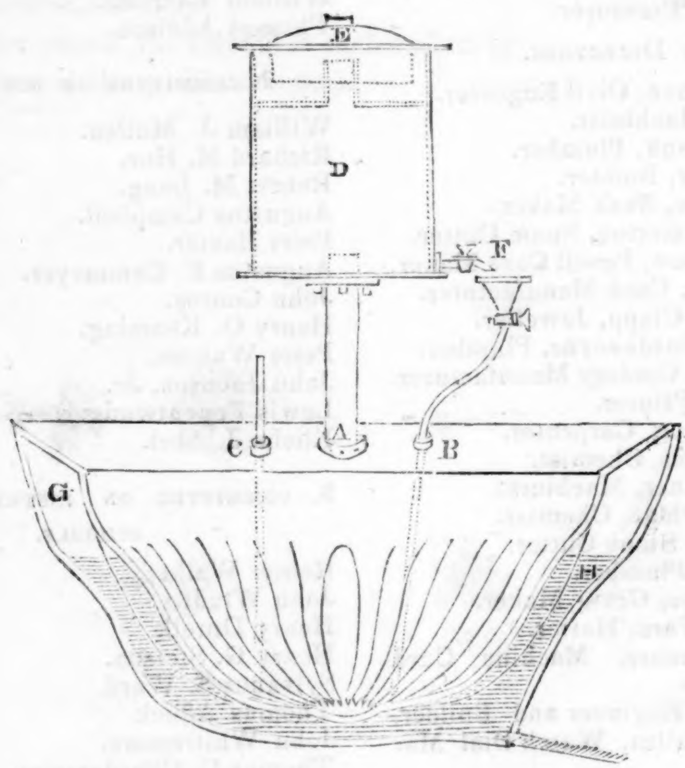


Fig. 2.

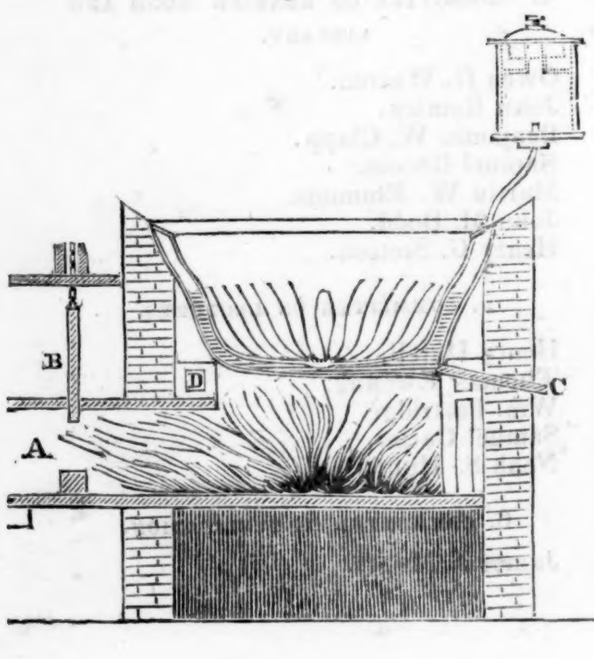
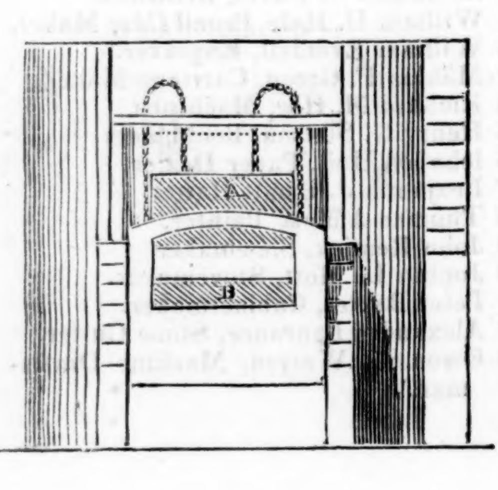


Fig. 3.



DR. URE'S PATENT CORRUGATED SUGAR-PAN OR TEACHE.

The pan is made of cast-iron, and is double. Between the outer case, which is evenly, and the inner one which is corrugated into a double surface, there is a space for containing a liquid medium, which is unalterable by the fire in any length of time, and serves as a bath to transmit a sufficient heat to boil the syrup very quickly, but intercepts the scorching temperature which cannot be burned in the inner pan, and the turns it into molasses. The sugar, therefore, fire need never be extinguished, as at present, when a skip is struck. Thus, much time, labor, and fuel, are saved. The pan may be set up by any bricklayer, at the end of the ordinary range of coppers in a colonial sugar-house, where the finishing teache now stands; or it may be worked by a separate fire at the pleasure of the planter, and may have the spare heat of its flue applied to the clarifier-coppers.

Fig. 1 is a section of the double pan. Being as tight as a bottle, and without seams or joints it is not liable to leak, like pans made of copper, which must be rivetted or brazed. G is the vacant space between the two pans for the play of the bath-liquor during the time of skipping, when no evaporation is going on in the inner pan. H shows the level of the bath-liquor about two-thirds up the side corrugations. A is a bent pipe, three inches wide, for connecting the space between the pans, with an iron drum D, called the condenser. Any watery vapor which may occasionally exhale from the bath, when overforced by fire, rises freely up the pipe A, and is condensed into water in D. The water thus condensed is quite pure, and is allowed to trickle slowly down through the stopcock F into the funnel beneath it, from which it runs back into the bottom of the medium through the pipe B, and thus preserves the boiling pitch of the medium always at the requisite temperature. The best heat of the medium for boilng sugar quickly without discoloration has been found to be from 300 to 310 degrees of Fahrenheit's thermometer, but it may vary a few degrees up or down wirhout inconvenience. The temperature of the bath may be made higher or lower, at the pleasure of the boiler. By merely preventing some of the water that exhales into the condenser D from returning into the bottom of the bath, the temperature is raised; and by pouring slowly a little more water into the bath through the pipe B, the temperature is lowered. A few quarts of water added make a difference of several degrees in the heat of the bath. E is a light basin of cast iron inverted over the open top of the safety-pipe of the drum D. The edges of the basin rest on 3 iron props, and dip an inch deep, or thereby, into some water poured round them, in the upper space of the drum. This arrangement forms a water-valve, which allows air or steam to pass freely to and from the bath-space between the pans, but at the same time cuts off the open communication between the external atmosphere and the bath liquor. This liquor consists of a strong solution of caustic potash, and may be preserved any number of years in a perfect state for sugar-boiling, by this plan of seclusion from the open air. Should the body of medium after a long time absorb so much carbonic acid or fixed air, as to impair its action as a bath, it may be easily made caustic again, and thus restored to its original state, by boiling it for half an hour in a copper with half a hundred weight of fresh slaked quick lime, and six times its bulk of water. This lime-mixture being allowed to settle a night in the large copper in which it was boiled, must be ladled off into smaller copper in successive portions, and boiled down till its boiling pitch rises to 290 degrees, or thereby. The copper should be partially covered with boards during this boiling up, and whenever the liquor is concentrated enough, the copper should be closely covered with boards or mats, till the liquor has become cool enough to be poured into the bath space through the aperture at C or B (unscrewed for this purpose,) by means of a funnel, or a stone pitcher with a spout.

The flange A, of the bent pipe, is made water-tight to the brim of a pan by a lead-washer, and is fixed down firmly with screw bolts, having square heads. The funnel-pipe B, with the lengthening piece for introducing water into the bottom of the medium for regulating the temperature of the bath, is fixed in its place by a union-joint screw turned by a screw-key or wrench. The thermometer tube-case has a flange, with lead-washer at C, by which it may be screwed tight into its aperture. Into this tube which is shut bottom, an inch or two of quick silver is to be poured, or sufficient for covering the bulb of the thermometer. This quick silver lying always in the tube, takes the temperature of the medium, and immediately imparts it to the thermometer, on dipping its open end down into the bottom of the quick-silver. The thermometer, after some experience in boiling with the pan, need only be used occasionally, as in the morning and afternoon. It shows at once, whether the bath is too hot or too cool, so that a little water may be poured into it through B in the former case, or a little of the conden-

sed water in D, allowed to run to waste, hby the stop cock in F, in the second case.

The condensing-drum D, must be propped in its proper position, while its being fixed on to the brim of the pan by the screw-bolts of the flange A. When the pan is briskly at work, both stop-cocks for regulating the medium may be shut, and slightly opened only when the pan is charged afresh with syrup; or the stop cocks after a little practice, may both be left always slightly opened, whereby the pan will become self-acting, by the circulation of a little vapor into the condenser, and a return of it in the state of water to the bottom of the bath. Water poured on the *surface* of the dense medium does not incorporate with it, and therefore has little or no effect upon its temperature.

Fig. 2 is a section of the patent pan when set as the first of the range. A is the flue leading to the other pans. B B, the shu t'e-valve, or dampers of fire-brick, by means of which the orifice of the flue may be lowered when required; thereby allowing the flame to have less contact with the bottom of the patent pan. C is the medium discharge-pipe, to be made use of only on finishing crop, when the medium ought to be run off into an iron drum, where it would remain free from the influence of the atmosphere till the following season. D D represents the circle of fire-bricks upon which the patent pan is seated.

Fig. 3 represents more clearly the action of the dampers, as previously shown. These are placed betwixt the patent pan and the second of the range. A and B are the two dampers, equal in weight, and consequently of easy adjustment. When the dampers are furthest apart, the patent pan is receiving the full influence of the fire, but as they approach each other the flame is sucked more rapidly through the diminished orifice, and is in consequence allowed less contact with the bottom of the patent pan.

By these means the fierceness of the fire, as applicable to the patent pan, may be completely controlled, without the least waste of fuel; for while little of the heat is acting upon the patent pan, more is made available to the other pans of the range.

The medium is carefully prepared under the superintendence of the patentee, in a laboratory fitted up on purpose, and is sent out in a state ready for use, in an iron drum-tank, packed in a cask. The orifice of the tank is closed with a screwed iron plug, having a lead-washer under its flange. On taking out this plug with a common screw-wrench, the medium must be poured by portions into a stone or metal pitcher, and thence into the bath-space between the pans; the discharge-hole at the bottom of the pan having been previously closed tightly with its screwed pipe, and flange with lead-washer. At the other end of this short pipe there is a stop-cock, which is never to be opened but when the bath-liquor is to be drawn off at any vacant period, for the purpose of making it caustic again after some years' use. This stop-cock should in general be incased in brick-work or mortar, to screen it from idle fingers. The bath-liquor is corrosive to skin and wood and should not be put into wooden vessels or much handled; if a little happens to touch the fingers, it may be washed away with a little water. Should some of the medium be found to be congealed, the bottom of the open tank may be plunged in boiling water for a little, or surrounded with blazing cane-trash, and half a gallon of hot water may be poured in to wash out the remainder.

Should the junction of the outer and inner pans, at their brims above, become in the least open at any time, they may be made secure again, by packing them with iron cement, made of ground iron borings sal-ammoniacs, well mixed, in the proportion of six pounds of the former to one ounce of the latter, and very slightly damped with water.

When fire is first applied to the pan, after the proper charge of medium has been introduced into it, the progressive heating of the bath must be carefully observed by means of the thermometer, standing in the quicksilver tube C. If the temperature rises to 290 degrees, or thereby, the pan is ready without discoloration. A charge of such syrup may be boiled off into good sugar, by the patent teache, in half an hour, and into fine syrup for shipment home, in half that time. At the instant of running off the granulating skip into the cooler, the firing should be suspended, and resumed as soon as the fresh charge of syrup is introduced. The pans have a shelving brim, to which the usual sloping saddle of lead or mortar cement may be most conveniently adapted, for allowing the juice to froth up without boiling over. The bath is a constant magazine of heat, by which the hot syrup is made to boil briskly immediately after its introduction, so that not an instant is lost in the operation of a sugar house. This pan is also more easily managed than the simple teache, as it cannot by possibility burn the juice, the fierceness of the fire merely agitating the bath for a little, without affecting the quality of the sugar. When there is no syrup in the corrugated pan, the medium should not be forced with a strong fire, as having no evaporable liquor to transfer its heat to, it might possibly boil up a little into the condenser. Even in this case

no evil could result, since the moment that the fire becomes moderate, or that fresh syrup is put into the inner pan, the drop of medium which may have been forced up into the condenser D, can be run back into its proper place, through the stop-cock F, and subjacent funnel-pipe.

For some time after beginning to use the pan, it is proper to look every two or three days into the state of the bath, and to measure the depth at which it stands. This is conveniently done, at any interval of the boiling, by unscrewing the quicksilver pipe C, lifting it perpendicularly up, and noting how high the wet mark of the medium is. If it corresponds with about the middle height of the side corrugations, all is right; if it shows the medium to stand lower, a few gallons may be poured in from the spare tank. Too much medium is not advisable, as it merely heats the sides of the pan above the level of the granulated skip, and as it leaves too little space for the free play of the medium exposed to a fierce and fluctuating fire.

From the London Mechanics' Magazine.

ON THE STATE OF THE ARTS OF DESIGN IN ENGLAND, WITH A POSTSCRIPT ON TAXIDERMY AND TRAVERTINO.

Sir,—Upon reading your judicious testimony before the Committee of the House of Commons on Arts and Manufactures, I was struck with a passage (p. 189, 642d No.) wherein you most appositely remark on the "wretched prints," and "still more wretched stucco images," with which this country is inundated by the itinerant *Italian* hawkers. A great portion of the plaister of Paris casts are good, and in good taste; but the prints are all, without exception, the most wretched that it is possible to conceive it possible to execute. Many of the plaister casts, too, are as bad as the prints; and your remarks on this head brought to my recollection a circumstance which tallies most opportunely with them.

Some ten years ago, walking in the country in company with a gentleman of extensive knowledge, and the most correct taste, we met an Italian lad bearing his board of images, most of which were of that horrible sort of rubbish most prized in country places—all daubed with paint, red, yellow, blue, and black. My friend asked the Italian how he could possibly think of selling such *ugly* things, and how he could look on them without being sick? The Italian's reply exactly tallied with that which you, Mr. Editor, gave to the Committee:—"No doubt they consulted the taste of their customers." He said, "*Ugly*, do you say? Yes, they are ugly; but some people's do like them for to be ugly!" and added, in Italian, "*In Londra, possiamo vendere le cose regolare; ma in campagna, ci vuole il colorato e barbaresco.*"—"In London we can sell the *regular* things; but here (in the country,) we must have the colored and barbarous." By-the-bye, I will remark, that the Italian did not mean to attach the epithet of "barbarous" to the colored, merely as colored; though I do not mean to say that he was actually aware of the fact of the ancients, both Greeks and Romans, painting the statues of their gods and goddesses to the natural hues, and clothing them in garments according to the most approved fashion of the day.

I should think that there can be little doubt but that the contemplation of, and the drawing from, good statues or casts, is far more efficacious in infusing a right knowledge of design ino the student, as well as good taste and judgment in the public, than engravings, drawings, or paintings, can possibly be. I mean, that *cæteris paribus*, the diffusion of good statues or casts will have a far greater effect in a community than an equal diffusion of engravings and paintings. The *facilities*, however, which occur in the dissemination of the latter, through the innumerable publications which are now accompanied by wood cuts or superior engravings, must give it the lead in the power of general instruction to a community.

Speaking of castings in plaster of Paris, I will mention a circumstance which, I dare say most of your readers will feel aware of, which is, the very imperfect representations of fishes exhibited in museums and collections of natural history, when the stuffed skins of the animals are given as something like unto the originals. When we look upon the stuffed and varnished skin of fishes we have never seen alive or dead, the faults in the representation do not strike us; but let any one look at the preserved specimens of cod, soles, salmon, pike, trout, &c., with the very *phisiognomy* of which he is quite familiar, and he will surely require the aid of the name affixed to the specimen in order to recognise his old acquaintance! Not one of the stuffed fishes of the collections bear any greater resemblance to the real animals, than a stocking stuffed with hay or wool would have any anatomical resemblance to the leg of a human being! The transformations of the stuffer are truly ludicrous. But it is not his fault; it is the *process*, which is entirely inadequate to the purpose. Birds, and some animals with long hair, such as bears, &c., may be tolerably well represented through the art of stuffing, &c. But has any one seen a

stuffed horse? I have, at Paris and elsewhere; and, unfortunately, our eyes are so familiar to the "noble presence," and to every beautiful swell and turn of the limbs and muscles of that noble animal, that the specimens I allude to, although executed by the first artists of the line in the world, might almost be mistaken for apes, or even cows, but for want of the ears and horns! But I am too prolix in the introduction of the trifle I have to present to such of your readers as are fond of fish and fishing, which has been my only diversion for many years. I have been in the habit of catching pike of 10, 12, and 20 lbs. weight; trout of 7, 10, and 11 lbs.; and in Italy, fish of much larger size. I was for some time in the habit of preserving a drawing of the best fish, by laying them on paper and taking the outline, an exact fac-simile as far as that went. I then attempted to stuff some of them, but succeeded no better than the gentlemen of the museums. I then thought of taking a cast in plaster of Paris of the fish, which I executed in more ways than one, all equally satisfactory. First, I took a cast of the fish, and then saturated it with linseed oil, and painted it from nature, so as to be, to all intents and purposes, a fac-simile. Secondly, I skinned the fish, took a cast, and then drew the skin over the cast. Thirdly, I made the cast from the unskinned fish, then skinned it, and drew the skin over the cast. The only difficulty I had was with the skin of the head, but that is of no consequence, and it might be overcome after three days' application. But by painting the cast the most perfect fac-simile is produced, both in form and color; and the latter will not be liable to the changes and blackening which occurs to the varnished skins of fishes.

I fear that you will accuse me of occupying your valuable columns with much trivial matter; but as far as the preservation, or rather *representation*, of fishes and reptiles is worthy of consideration, I think that the "preservers" will be benefitted by this communication.

Another word or two on a subject connected with the preservation of stone and roofs, &c. The stone of which the Church of St. Peter's, at Rome, is constructed, is a calcareous, stalictitious stone, called Travertino, formed by an agglomeration of bushes, leaves, roots, and some shells, by means of a calcareous fluid by which the whole is fossilised. The very process of this formation may be observed in all its various stages of progression and completion, on the road to Tivoli, about twelve miles from Rome. This is an interesting topic, but I must only allude to it in order to introduce the Travertino, which I have to represent as rather liable to honeycombs. These honeycombs when they occurred in the surface of any of the steps, copings, terraces, &c., on the vast surface of the top of St. Peter's Church, were usually filled with melted pitch or some kind of cement; but the great heat of the sun, combined with the action of the air and water, soon melted, decomposed, and dissipated these fillings in. In 1804, I recommended the application of melted sulphur into all honeycombs, cracks, crevices, and junctions in the stone or clinkers, which constitute the top and pavements of St. Peter's Church, which, in extent and appearance, is very much like a small town or fortress. The sulphur was universally applied; and up to 1815, I had frequent ocular proofs that it was no more affected by the sun or atmosphere, than would have been so much pure gold. To this, I will only add, that from subsequent experiments I have found, that by the addition to the sulphur of a small quantity of iron filings, a very hard sulphuret of iron, or artificial pyrites is produced. Copper, or brass filings would probably produce an analogous result.

I have read, with very great satisfaction, in your last number, Mr. Thomas S. Mackintosh's Electrical Theory of the Universe, to which I take the liberty of soliciting the particular attention of your philosophical readers. I shall venture to offer some remarks upon it next week. Meantime, I have the honor to be, Sir, your obedient servant,

F. Maceroni.

New application of caoutchouc.—India-rubber has been applied in Paris to the casting of steel busks for ladies' stays, and it is said to answer well in resisting the metalic oxides upon the dresses.

Cast and wrought-iron wheels—It was also stated, that where cast-iron wheels on rail-ways would only last six or eight months, wrought-iron would serve at the same work three or four years.

Sugar from beet-root—Messrs. Fies and Haverwald, of Quedlinburg, in Westphalia, have discovered a process, whereby, in twelve hours, ten lbs. of pure sugar, perfectly chrystalized, may be extracted from 100 lbs. of beet-root. The secret was immediataly purchased by M. Brokhoff, of Wisburg, for 20,000 francs, with the condition that it should not be used beyond the provinces of the Rhine and Westphalia.—[Lond. Mechanics's Magazine.]

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR IMPROVEMENTS IN THE PROCESS OF, AND APPARATUS FOR, DISTILLING SPIRITS OF TURPENTINE AND OTHER ARTICLES. GRANTED TO ISAIAH JENNINGS, CITY OF NEW YORK, AUGUST 27, 1835.

My improvement in the process when turpentine is to be distilled, consists in the addition of a portion of spirits of turpentine to the crude turpentine from which the distillation is to be made; the addition being made in such proportion as shall bring the turpentine into such a state of fluidity as shall admit of the subsidence of all the foreign matter contained therein as may be sufficiently heavy to fall to the bottom, and of the rising of chips, and other light materials to the surface, whence they may be readily removed, and the clear turpentine poured off from the sediment. The quantity of spirits of turpentine to be added will depend, in part, upon the warmth of the weather, or of the place in which the mixture is made; and also upon the thickness of the turpentine to be operated upon, and the impurities which it may contain. The mixture and separation of the impurities may be promoted by artificial heat, care being taken that the temperature is not such as shall occasion a waste of the spirit by evaporation.

The apparatus which I employ consists of two vessels within each of which a still worm of the usual construction is to be contained; or instead of the worm any kind of heater, or refrigerator, by which analogous effects are produced, may be employed; these vessels are to be connected together in a way to be presently described, and one of them is to answer the purpose of a still, whilst the other is to operate as a refrigerator, or condenser. The prepared turpentine is to be contained in any convenient reservoir whence it may descend through a tube into the worm which is to operate as a distillatory, its flow being regulated by a stop-cock. The vessel containing this worm is to be closed at top, and the worm is to be heated by the introduction of steam, heated air, water, or other fluid; steam, however, being preferred; a sufficient degree of heat may be thus applied to separate the spirit from the rosin as the material descends from the top to the bottom of the worm. The lower end of this worm passes through the vessels, and into a large vertical tube which is placed between it and the refrigerator or condenser. This vertical tube rises as high as the top of the condenser, and descends several inches below the point at which the first named worm enters it, having below this point a tube for the discharge of the rosin, which, not being volatile, will descend and run out by its own gravity. Its flow may be regulated by a stop-cock, and may be promoted, if necessary, by the application of heat to the bottom of the tube.

The vapor of the spirit will rise towards the upper end of the tube, whence it will pass into the refrigerating worm contained in the condensing tube, down which it will pass, and be condensed in the usual way.

I intend to apply the same apparatus to the distillation of common tar, coal tar, and other analogous articles, diluting them also, with a portion of their own spirit, or with any other which will produce a like effect.

What I claim as my invention, is the preparing the turpentine for distillation by diluting it with distilled spirit, and separating by this means, the foreign matter therefrom, thereby producing a bright clear rosin, and an improved spirit. I also claim the employment of the worm, or other analogous apparatus, to be heated in the way described, and arranged and connected in the manner, or upon the principle herein set forth, so that it may answer the purposes for which it is ordinarily employed. I also claim the preparing and distilling of common tar, coal tar, and other analogous articles by dilution, and subsequent distillation in the same apparatus.

ISAIAH JENNINGS.

SPECIFICATION OF A PATENT FOR A MODE OF DESTROYING WEEVILS, IN GRAIN; TO EXPEL MOISTURE FROM GRAIN, MEAL, MANUFACTURED FLOUR, AND FOR DRYING MALT.—GRANTED TO JAMES A. LEE, ADMINISTRATOR OF JAMES LEE, DECEASED, MAYSVILLE, MASON COUNTY, KENTTCKY, AUGUST 17TH, 1835.

This improvement consists of one, or more, hollow cylinders, or prisms, made of sheet iron, or other metal, of any required dimensions in diameter or length. Fixed on an angle in an inclining position, in the manner of a bolting-reel as is used in mills for bolting flour; it is enclosed in an oven or arched room, made of brick, stone, or other material, sufficiently wide to contain one or more cylinders, or prisms, aside of each other, and of height sufficient to admit of one or more stoves, or flues, calculated to communicate to the cylinders, or prisms, the quantity of heat required for destroying the living insects and their eggs in the grain,

and for thoroughly expelling the moisture from the grain, malt, meal, or manufactured flour; the cylinders, or prisms can be moved either by hand, or machinery; the grain, malt, meal, or flour, is introduced through a hopper at the upper end of the cylinder, or prism, and by its inclining position and revolutions it is carried to the lower end, where it is discharged; in its passage down, the grain and malt is kept rolling, the meal and flour is constantly kept in a floating, pulverized state, not subject to concretion, or coagulation, and to prevent the meal, &c. from adhering to the cylinder, or prism, and being subject to be burnt, I fix several combs on the surface of the cylinder, to raise strikers of sufficient weight or force, to jar the cylinder, so as to disengage the meal, or flour, that may adhere to it.

By the process in this improvement the living weevils, or other insects, will be killed, and their eggs destroyed; the moisture in the grain, malt, or manufactured flour, and meal, will be effectually expelled, so that when repacked into seasoned barrels, and stored in dry places, the grain, meal, or flour, may be kept sweet for years in the warmest climates, free from fermentation or putrefaction and the ravages of insects, and the malt dried as may be required, at the same time the germinated parts of the malted grain will be broken off by the revolutions of the cylinder, or prisms. It is not necessary that the meal or flour, should be cooled before repacking; the moisture being driven out, it cannot spoil, and may be suffered to cool in the barrels.

Now what I claim as new and as the invention of the said James Lee, deceased, for which I solicit letters patent, is the use of the hollow, inclined cylinder, cylinders, or prisms; and strikers, in connection with a chamber, or oven, heated by means of stoves, or flues, operating in the manner and for the purposes herein set forth ard described.

In testimony that the foregoing is a true specification of my late father's invention, or improvement, I have hereunto set my hand at the city of Washington, in the District of Columbia, this 3d day of August, 1835.

James A. Lee, Administrator.

From the American Journal of Science and the Arts.

MISCELLANIES—FOREIGN AND DOMESTIC.

1. Alum may be used for ornaments, like alabaster. When of a proper degree of solidity, it may be wrought with tools, polished, &c. When melted by heat, it may be cast into pasteboard moulds, and then polished or wrought. While in a melted state, it may be colored to suit the fancy. If rubbed with an excaustic of yellow wax, the appearance of marble or alabaster may be given to it. (J. G.)

2. Cement. (J. G.)—Calcined and pulverised shells, mixed into a paste with coarse or refuse oil, makes a cement, used in India for stopping the joints of boats, &c.

3. A heater or calorifactor, for preserving the heat of the body in attacks of cholera, or severe and protracted chills, is made with advantage, by forming a semicylindrical case of tin, which will cover the body when in bed, leaving an opening at one end for the neck, so that the head may protrude. This case is made double, with a space of four inches between the inner and outer sheet. One opening is left at the top, for the insertion of a funnel, through which hot water is to be poured, and another small opening for the escape of air. This case is to be pressed down, over the patient, when in bed, and the clothes packed round it. If covered with a blanket, it will, when charged with hot water, retain the heat a great while. It need not be *filled* with hot water. The steam which rises, keeps the upper part hot. The two sides should be connected by a tube, to equalize the flow of the water. In fifteen minutes the pulse has been raised from sixty-one to eighty-seven per minute. In rheumatism, and all cases in which sweting is indicated, this instrument may be effectually used. The water is drawn off by a stop cock at the bottom. (J. G.)

4. Freezing mixture. (J. G.)—Four pounds of pulverized sulphate of soda, (not efflorescent,) and three pounds of cold dilute sulphuric acid, (seven pounds strong acid and five pounds of water, mixed the day before using.) I have prepared by this process more than three hundred pounds of artificial ice.—Boutigny. *D'Evreux.*

5. A good *Safe*, or victual preserver, is prepared, by making it of a double case of wire gauze, and filling the interval with fresh charcoal, in fine pieces. Fresh meat, when suspended by hooks from the top, will keep good and sweet for a week in this safe, in the hotest weather.—(J. G.)

6. Cure for Cramp. (J. G.)—A bar of iron, placed across the bed on which the person sleeps, under the mattrass, about as high from the foot as the calf of the leg, is said to be an effectual perventive. The bar may be an inch square. In defect of a bar,

a poker or other iron will answer temporarily. If there be two mattrasses, it may be placed between them. This remedy was strongly recommended by Dr. Chretienne, of Montpelier, and has proved availing in a vast number of cases.

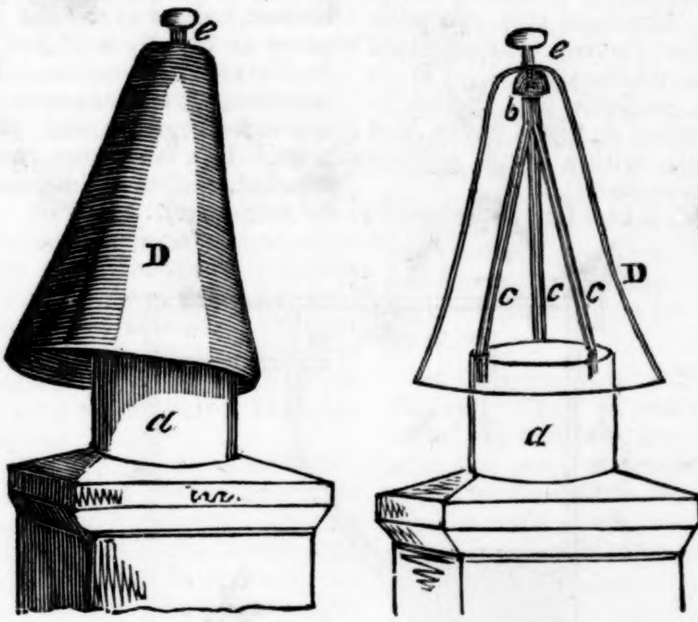
7. Excellent ink, and easily made. (J. G.)—Into a ten gallon keg, put three pounds of copperas, well pulverized. Take three pounds of logwood, and boil it in six or seven gallons of rain or pure river water, and when it has boiled half an hour add four pounds of nut galls, broken up, and a quarter of a pound of alum. After another half hour's boiling, pour the whole of the materials into the keg, stir the contents well together, and let it remain a week, stirring the whole several times a day. Then put into the keg half a pound of gum arabic, in powder, and one pound and a half of sugar candy. Leave the mixture a week longer, stirring frequently. After three weeks' rest and settling, the ink may be used at pleasure, growing better with age.

To keep it from moulding add a dram of cloves and cinnamon, in powder, with an ounce of anise seed.

To render the ink of a beautiful blue black, add to the above contents a quart of sulphate of indigo. The latter is prepared by taking a quarter of a pound of indigo, reducing it to small pieces, sprinkling a little water on it, and the next day add to it two pounds of sulphuric acid, and leave it to digest in a warm place.

8. To silver iron. (J. G.)—Add to a solution of silver in nitric acid, a portion of common salt. Wash the precipitate thoroughly on a filter, and let it dry. By rubbing this powder on the iron or steel, (previously coppered, by plunging it, with a clean surface, into a warm solution of sulphate of copper, and rubbing it with a polisher,) with a little cream of tartar, a coating of silver may be established, which admits of a fine polish.

9. Movable hood, for smoky chimnies. (J. G.)—The following is desciibed as a simple and effectual cure for smokey chimnies.



The flue of the chimney terminates in a cylinder of cast of strong sheet iron, (*a*,) one foot in diameter, firmly set in the top of the masonry. Three light iron rods, (*c*, *c*, *c*,) rivited to the cylinder *a*, rise about two feet above it, and unite in a piece of iron, (*b*,) of a triangular shape, and three or four inches long, and having a hemispherical termination. The half ball has a hole bored in its upper part, at least an inch deep and one fourth of an inch in diameter, and well tapered to receive the screw *e*, which is provided with a good thumb piece. This screw holds the hood *b* in its place, and serves as its axis of motion.

The cono D is of sheet iron, two feet long and two feet in diameter. When at rest, its base is horizontal. It has a truncation or flatening at the top, four inches at least in diameter, with a hole for receiving the screw. It is made somewhat concave, and the hood must be so adjusted as to turn freely on its axis.

When the wind blows strongly, the hood

is pressed against the chimney on the windward side, and the smoke freely escapes on the opposite side.

When the chimney is to be swept, the hood is unscrewed and removed for the purpose, if necessary.

When the wind is variable, the hood is liable to rattle against the cylinder, and occasion an unpleasant noise. This may be prevented, by punching holes round the cylinder, and attaching to it, by means of wire, a band of thick list or double piece of cloth. The hood must extend at least an inch below the top of the cylinder.

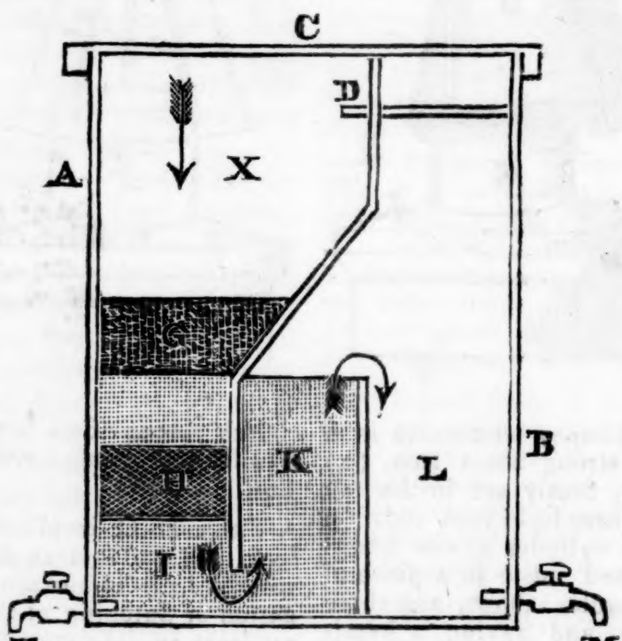
10. Method of coating Busts and Plaster Casts, so as to give them the appearance of marble; by M. Pleuvarre. (J. G.)—Into a wooden tub or trough, put a strong and warm solution of alum. Into this plunge the bust or plaster cast, previously made perfectly dry, and let it remain therein from fifteen to thirty minutes; then suspend it over the solution, that the superfluous portions may drain off, and when it is cold, pour over it a fresh portion of the solution, and apply it evenly by a sponge or cloth. Continue this operation until the alum has formed a crystallized coating over the whole surface. Put it aside, and when perfectly dry, polish it with fine sand paper, or glass paper, and complete the polish with a cloth slightly moistened with pure water.

A wooden vessel is best for the solution, warmed by steam from a boiler, because metals are apt to color the solution. This coating gives greater solidity to the substance, and possesses the whiteness and transparency of the finest marble. It stands the attacks of moisture in any apartment,—is less subject to become soiled, and is as easily cleaned as marble.

In this manner, excellent copies may be obtained of antiques, as well as moderns, at a price little exceeding common plaster casts.

11. Iron Cement. (J. G.)—The Fountaineers of Paris, make use of an iron cement, for uniting the stones which form their fountains. It is very strong, and may be employed in a variety of occasions.

Take one part of vinegar, and four parts of pure iron filings, stir them well together every hour for six hours, or until the mixture begins to form a good paste. To unite stones by this cement, clamps are to be first attached to the stones, which are to be very dry. The surfaces (of the stones,) to be united, need not be more than two lines (at farthest,) apart at the top, and to terminate below at the depth of five or six lines, at the distance of one line. The mastic once introduced into this space, the stones are to be pressed together, and the cement allowed to set. In a few hours, the surface may be polished, and the joint becomes as firm, as the stone itself.



12. Filtration of Water for Domestic purposes. (J. G.)—Many families and individuals are subjected to great inconvenience and often to the injury of health by the use of impure water. The water of wells and springs, is very frequently impure,

not only from the ingredients which it holds in solution, but from earthy and foreign matters suspended in it. From the former, that is, the saline and calcareous matters which are completely dissolved in it, and which render it hard and unsavory, it cannot be deprived by filtration merely, but from those foreign substances, which destroy its transparency and make it turbid and unpleasant, the filter is an effectual remedy. Besides, there are few dwellings, whether in situations where the well water is naturally hard and injurious, to those who drink freely of it, or otherwise defective, from which, with a little attention, rain water may not be caught in sufficient quantity to answer for cooking and drinking, and this when passed through the filter we are about to describe, is perfectly fit for these uses.

The cheapest kind of filter, and at the same time, one of the best ever used, is the following.

A B, is a wooden box made of pine plank, which should be previously boiled several times in water, to remove all the resinous, or soluble parts which give taste to the water. C is a cover with a rim, and D is a sliding board, to keep the filtered water from dust. X receives the water to be filtered, which first passes through a bed of coarse gravel G, terminating in fine sand, and then through a bed of charcoal H, coarsely pounded, and again through sand, resting on fine gravel I. From this, the water passes through an opening one and a half inches high, at the bottom of the partition, into the compartment K, which contains only fine sand. The compartment L, receives the filtered water, which is drawn off through the stop cock M. F, is a cock for emptying the machine when necessary for cleaning.

The sand and gravel must be carefully washed before using, and the charcoal carefully selected and free from taste. If this box be nine inches square at the bottom, and thirteen inches high, it will be sufficient for an individual. Larger dimensions may adapt it to family use, and if made higher in proportion to its breadth than the above ratio, the filtration would be more thorough. The materials should be renewed once in five or six months, or oftner, if necessary.

13. To render Oil casks impermeable. (J. G.)—When the cask is new and ready to receive the oil, pour into it a concentrated and hot solution of sulphate of soda, (Glauber's salt,) spread it well over the whole interior surface by a sponge, cloth or broom, so that the wood may become thoroughly impregnated with the liquor. When it begins to grow cold, withdraw it, heat it again to boiling and renew the operation three or four times. Wipe off the superfluous salt with a coarse cloth, let it dry a few hours, replace the head, (the inside surface of which should have been treated in the same manner,) and it will be found that the pores have been effectually stopt by the salt, so that the oil may be safely introduced.

14. To purify cold short iron, a very simple process is practised in some bloomeries, which consists in throwing on the loupe at the moment when it is formed, half a shovel full of powdered flux, and keeping it afterwards exposed to the air of the bellows for a few moments, before it is carried to the hammer. The flux thus employed, is a limestone, which yields lime of good quality. Its effects on the loupe, are very prompt, depriving the iron of the siderite or phosphate of iron, which as is well known, renders the iron brittle when cold.—(J. G.)

15. Method of Bronzing Iron and Gun barrels. (J. G.)—Gun barrels when damasked, are less liable to rust, and any of them, of whatever price, may be treated by a very simple method, which will diminish their readiness to oxydize. When the iron is well scraped and cleaned, cover its surface with a coating of butter of antimony. If one is not sufficient, two or three coatings may be given. The iron thus acquires a horny reddish brown color, which is not unhandsome, and which preserves it from rust. When the iron has acquired the desired tint, wipe it carefully, warm it a little and then rub it with white wax, until there remains no longer any visible traces of the wax. This renders its preservation complete.

18. Introduction of Burden's Boat into France. (O. P. H.)—Baron *Seguier*, member of the Institute, has constructed a boat after the plan of Burden's, of two double cones, one hundred feet long, with the engine between them, which with the boiler presents some improvements.

M. *Cave*, a mechanical engineer, has also constructed a double boat, for the navigation of the canal of Somme. It differs from the preceding in being open at the surface covered with a flooring and has two keels and two helms.

A similar boat has been constructed for the navigation of the Loire, between Nantes and Angers.—[Bul. Soc. Enc. l'Ind. Nat.]

LIVERPOOL AND MANCHESTER RAILWAY.

The eighth half yearly meeting of the shareholders of the Liverpool and Manchester Railway Company was held on

Wednesday, the 27th of January, in the Cotton Sale-room, at the Exchange, Liverpool; Charles Lawrence, Esq., in the chair. The Report of the Directors for the last six months, which was submitted to the meeting, was highly satisfactory to the shareholders, showing a considerable increase of receipts, and in some important points showing a positive, and in most a comparative, reuction of expenditure. The receipts appear to have been—in the

Coaching department	*l*67,897	19	2
Merchandise department	46,375	15	8
Coal department	3,682	8	8
	*l*117,956	3	6

The increase in the merchandise department is the more gratifying, inasmuch as it has taken place in the face of a considerable reduction in the rates of freight made by the Mersey and Irwell Navigation Company, whilst the rates of carriage by the railway remain unaltered. The total expenses (including 3,409*l.* 16*s.* paid for goods destroyed by fire) amount to 71,995*l.* 13*s.* 4*d.*, leaving a nett profit of 45,960*l.* 10*s.* 2*d.* Out of which the Directors recommend that a dividend should be made of 5*l.* per share for the half year; and that 6000*l.* should be appropriated to the purchase of heavier rails, leaving a balance of 1,569*l.* to be carried to the credit of next half year's account. The cost of locomotive power, which has been for some time the heaviest and most formidable item in the expenditure of the Company, appears to be undergoing a gradual diminution. For the last half year it amounted (including the cost of three new engines) to 15,681*l.* 17*s.* 9*d.*, being about 800*l.* less than during the preceding half year. This is a very satisfactory reduction, when it is recollected that there has been a large increase of business, the receipts of the last half year having exceeded those of the half year preceding by upwards of 18,000*l.* In the maintenance of way there is an increase of about 1,500*l.*; and it does not appear probable that any considerable reduction will be made in this branch of expenditure until the line generally shall have been laid with heavier rails. The Report stated that the works connected with the tunnel under the town of Liverpool, and the new entrance in the Old Haymarket, were advancing towards completion, and would be finished by the end of the month of May. It was stated, in reply to the inquiry of a proprietor, that the propriety of forming a new station for passengers at Manchester was under consideration, and that, if formed, it would be covered by a roof, as at Liverpool, to protect the passengers from the weather. The Report, which appeared to give general satisfaction, having been agreed to, and a dividend of 5 per cent. on the last half year having been declared, the meeting broke up.—[Manchester paper.]

Our countryman, Mr. Perkins, has brought out a new steam-boiler for locomotives, of which he speaks in high terms. He claims for it no less than 13 advantages over his previous boiler. We will publish, in our next, his description, or so much of it as we find in the London Mechanics' Magazine.

MR. PERKINS' CIRCULATING STEAM-BOILER.

In 1832, Mr. Perkins took out a patent for a new steam-boiler on the circulating principle, which was more than once noticed in our Journal for that and the following year, and the advantages which it offered freely allowed; while, at the same time, its originality was as freely questioned—that is to say, Mr. Perkins was alleged to have but resuscitated, or rather re-invented (no doubt very unconsciously), a mode of construction first promulgated two or three years before in the pages of the *Mechanics' Magazine*. Mr. Perkins has now produced what he calls "a new modification" of this circulating steam-boiler; and in the first number (just published) of the *Magazine of Popular Science*, edited at the Adelaide Gallery (which owns, we believe, Mr. Perkins for its originator, if not founder), there is a very elaborate exposition of its merits from the pen of Mr. Perkins himself. We are far from subscribing to all Mr. Perkins says in favor of his new boiler, even as thus modified, for notwithstanding he assures us that his statements can be demonstrated "not only theoretically but practically," there are some of them which it would be difficult to reconcile with any received theory; and we cannot forget that this very boiler has been *tried* on the Liverpool and Manchester Railway, *but not adopt-*

ed; though Mr. Perkins, in his present essay, takes no notice whatever of that trial or of its results! But mixed up with Mr. Perkins' rather extravagant laudation of his invention we find so many valuable practical hints and so much ingenious and suggestive speculation, that we must place the whole of his paper, with but little abridgement, before our readers. Of the new periodical in which it appears, we must not omit the opportunity of saying that the projection of it does great credit to the Institution from which it emanates; and that though in this its first number it has rather too much of a horn-book character, there is nothing either in its plan or in the talent displayed in it, to forbid our entertaining strong hopes of its proving a most useful auxiliary in the cause of practical science. We cordially wish it every success.—[Ed. M. M.]

Extracts from Mr. Perkins' Paper.

The following are the advantages which result from a new modification of the circulating steam patent, granted to me in 1832:

1. Absolute removal of all the danger arising from explosion.
2. Great economy in fuel.
3. Much reduction of boiler-room, as well as of weight.
4. Not one third of the water in the boiler now used, being necessary.
5. There being no possibility of any deposit of foreign matter in the generators.
6. No furring up of the boiler, as all the deposit will of itself collect in a place provided for it, and be blown off at will.
7. The generators always being kept at the evaporating point.
8. The impossibility of burning any part of the boiler or generators by the most intense heat.
9. The boiler and generators not being in the least affected by expansion and contraction, owing to the peculiar arrangement of the tubes or generators.
10. The perfect and simple method of separating the steam from the water and foreign matter.
11. The getting up of the steam in less than half the time now required.
12. The simplicity of the construction of the boiler, and the ready method of repair.
13. The absence of all destructibility by burning,—in consequence of using anthricite coal,—although the fire be urged to its greatest intensity.

The above facts can be demonstrated not only theoretically but practically. An operating model of this boiler may be seen daily at present at the National Gallery of Practical Science.

Explanation of the first-mentioned Advantage.

The great drawback upon the important invention of steam navigation has been the disastrous effects caused by the explosion of steam-boilers. The great importance of a perfect remedy will readily be admitted. The many experiments which I have made within the last ten years, go to prove that if the steam be generated in tubular boilers, no danger can result from explosion; but there are many almost insurmountable objections to tubular boilers as hitherto constructed, particularly for steam-navigation. The boiler which is now about to be described, possesses apparently all the properties which have hitherto been sought after. To show the reason why this boiler is free from explosions, the causes (of which there are at least three) must be described.

This *first* and most common cause is from the pressure of common steam. What is meant by common or pure steam, is such as has not been sudeenly elevated, or such as has not been compounded with an explosive mixture, by the improper management of the boiler.

The first kind of explosion is quite harmless, as the boiler simply rends or gives way in the weakest place, which is caused from wear, or some defective spot. The *second*, which I some years since accidentally discovered and published, (and which has since been experimentally proved to be correct, by the celebrated French philosopher, M. Arago,) arises from the water getting too low in the boiler. The fire then impinging on that part of the boiler which is above the water, causes the heat to be taken up by the steam, which rises by its superior levity to the top of the boiler, causing it sometimes to become red-hot, and so elevating the steam to a much higher temperature than its pressure would indicate. Now, when the boiler is in this state, and the safety-valve suddenly raised, the water will be relieved from the steam pressure, and rush up amongst the surcharged steam which thus re-

ceives its proper dose of water; at the same time, that part of the boiler which has been raised in temperature, giving off its heat to the water so elevated, steam is generated in an instant, of such force as no boiler can resist. This kind of explosion has of late years been very frequent and disastrous, particularly in America.

The *third** and less frequent kind, although most terrific, is undoubtedly caused by an explosive mixture having been formed in the boiler. It has long been known that hydrogen has been often liberated, by the boiler being overheated by improper stoking, as well as not being properly supplied with water; but simple hydrogen cannot explode,—and where it could get its atmospheric air, which is absolutely necessary to form the explosive mixture, it has been difficult to understand. We have only, however, to look at an air-drawing feed-pump, and the source will be readily seen, It is frequently the case that the feed-pump draws air as well as water, arising from its unsoundness, &c. The more air the pump† draws, the less water is forced into the boiler; of course, the boiler is more and more exposed to the fire, and the heated parts of the boiler become oxydised, and rapidly liberate hydrogen; and as sufficient air has been pumped into the boiler to form the mixture, it will be ignited by an overheated part of the boiler, and the tremendous effect can only be equalled by an explosion of gunpowder.

The construction of this boiler may now be described; but the practical objections to the tubular, the compound tubular, and the common boiler must also be described, so that the remedy to these practical defects may be better understood. The two greatest practical objections to the tubular boiler are its furring up and burning out. After great expense and time, I came to the conclusion that until these two practical difficulties could be removed, they would be fatal to the economical generation of steam for any other purpose than that of steam-gunnery. I have, however, at last been so fortunate as to hit upon a modification which has completely removed all objection to this method of generating steam, and which I will now attempt to describe.

This new boiler is made up of generating tubes and the common flat-bottom wagon-boiler; from this flat-bottom a series of tubes hang perpendicularly over, and in, the fire, from one to two feet in length, according to the size of the boiler, and from two to three inches in diameter. On the upper side of this flat-bottom is a continuation of these tubes projecting the same distance into the water in the boiler. In the interior of the tubes which hang in the fire, is fixed a thin tube, wo inches in diameter; when the tube is 3 inches, internal diameter; open at the top and bottom, and ten inches in length, this tube stands upon three legs, each one inch long, and the water stands level with the top of it. These generating-tubes are hermetically-sealed, so that the steam which is formed in the interior of the upper half of the tube cannot possibly escape.

The important effect of circulation is more apparent in this modification of the boiler than in any other which I have tried. The upper, or evaporating part of the hermitically-sealed tube, contains steam of a temperature of about 80° above the boiling point, when the steam is generating at atmospheric pressure; but when generating at a higher pressure, the evaporating point increases in a geometrical ratio. This part of the tube, which is surrounded with water, is incased in a very thin tube, open at top and bottom, which causes a very rapid circulation, and sweeps off the heat so effectually, as to be certain of keeping the steam in the upper part of the tube, at the evapo-

* This theory has not, to my knowledge, been published; and until recently, I did not see how the atmospheric air could find its way into the boiler, which is so essentially necessary to form the explosive mixture.

This kind of explosion cannot take place in the new boiler, since no hydrogen is formed in it; for no part of the boiler is exposed to the fire but the bottom, which is certain to be kept at a temperature quite as low as the water in the boiler, which surrounds the generators, by the dashing down of the water outside of the circulating tubes.

Having had about twelve years' practice in generating high steam, from 1,500 pounds to the inch downwards, and having established the fact, that no dangerous result has occurred, although a great number of explosions have happened; and having at length removed all practical difficulties, I feel warranted in undertaking to guarantee to the public a system of generating steam of any required power, not only with increased economy, but with perfect safety.

† If the feed-pump is surrounded with water, as is inevitably the case with condensing-engines (and only such are used in this country for steam-navigation), atmospheric air cannot get into the boiler. Upon inquiry, I find that nearly all the feed-pumps used in America, are worked without having water outside the pump. This undoubtedly is one of the reasons why there has been so many more accidents in America than in England.

rating point. Experience shows that, after the steam begins to form, not only the fire part of the tube, but the evaporating part of it, which is in the boiler, receives no more addition to its temperature, not even one degree—which proves the great importance of rapid circulation.

It is well known that water is a worse conductor of heat (particularly downwards) than any other matter; but at the same time, the property which water has of carrying heat upwards, is greater than any other matter. Now, this law of the upward-carrying power of water is taken advantage of, and by filling the tube about one third full of water, the steam which is generated is given off at the top of the internal tube, and will constantly keep the evaporating chamber filled with steam, of a temperature in proportion to the density of the steam in the boiler. The effect of the most intense heat serves only to generate steam the faster, without raising the temperature of any part of the boiler, generating-tubes, or steam; while without circulation, the boiler would, as is often the case, get red-hot, and generate less steam, by driving off the water from contact with it, and materially injure the boiler. So long as there is enough water in the bottom of the boiler, to be above the bottom of the circulating-tube, say two inches, no derangement of the tube can take place, as the steam and water will, although it is obliged to rise 12 inches, sweep off the heat from the evaporating-tube, which will prevent an explosion of the tube, and which would inevitably take place, when the boiler gets empty or dry, were it not that in the centre of the sealing-plug is affixed a fusible metallic plug, which is rivited into it, and will melt before the steam is sufficiently powerful to burst the tube.

For marine and locomotive purposes, it has been found that brick-work must be dispensed with, on account of its weight and bulk; of course, the fire must be made within the body of the boiler. Now, it so happens, that this new modification of the tubular boiler is extremely well calculated for an internal fire-place; for we have only to extend the outward row of tubes down to the firebars, and we have the most convenient and economical fire-box.

Second Advantage.—Although it is not yet accurately ascertained what the saving of the fuel is, yet, from repeated experiments, I have no doubt that it will amount to one third of the fuel now used by the best marine boilers.

Third Advantage.—The reduction of boiler room is owing to the greatly increased evaporating surface in the boiler, which allows much reduction in size, and for the same reason in weight.

Fourth Advantage.—In consequence of the interior of the boiler being filled with evaporating tubes, which displace a large portion of the water, as well as the reduced size of the boiler itself, it is not too much to say, that one third of the water commonly used will be sufficient.

Fifth Advantage.—In consequence of there being no possible escape from the hermetically-sealed tubes, there cannot be any deposit, as the same water in the generator may be worked over and over again, *ad infinitum.*

Sixth Advantage.—The furring up of the common boiler is occasioned by the sluggish circulation of the water in the boiler, and the extra heat at the bottom of it. But forced circulation not only takes up the extra heat, but keeps all the foreign matter in motion, and as there is a much more rapid circulation at the fire-end of the boiler than at the other, all the matter that would otherwise deposit and become fixed, finds its way to the other end, and can be drawn off by a stop-cock at pleasure, as it will never incrust.

Seventh Advantage.—The generator cannot get above the evaporating* point,

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* To prove the best temperature to generate steam, I prepared an iron cup, of massive thickness, cast for the purpose; it was heated to a white heat, and, whilst it was allowed to cool gradually, several measures of water were placed in it, one at a time, each in succession, as soon as the previous one had evaporated to dryness.

The 1st measure in evaporating occupied 90 seconds.
2d 80
3d 59

The vapor, or steam, thrown off, began now to appear, and became more distinctly visible with the evaporation of succeeding measures of water

4th measure in evaporating occupied 30 seconds.
5th 20
6th 12

7th measure showed what I had termed the evaporating point, and in a dense cloud of steam, evaporated suddenly in 6 seconds.

8th measure occupied a longer period, viz. 10 seconds.
9th measure in evaporatisg occupied ... 20
10th 32

And the 11th measure did not boil.

The first measure of water, although contained within the iron cup at a white heat, was perceptibly not in contact with the metal, but was repelled to some

since the extra heat is for a certainty swept off by the rapid circulation.

Eighth Advantage.—Experience shows that wherever circulation is active, no heat can get above the evaporating point, let the heat be ever so strong.* This boiler is so constructed that no part of it is exposed to strong heat, where strong circulation is not at the same time going on; consequently no over-heating can by any means take place. It is a fact, that no extra heat can get into the steam, since no heat is suffered to pass into the boiler above the water, let it get ever so low.

Ninth Advantage.—The tubes of the locomotive tubular boilers now in general use, are riveted at each end; and as no provision is made for guarding against expansion and contraction, the wear and tear is enormous. The tubes, however, in this boiler are connected in the middle, and each half is allowed to contract and expand without impediment.

Tenth Advantage.—To separate the steam from the water and foreign matter, a small steam-chamber is attached to the top of the furnace-end of the boiler. A pipe somewhat larger than the steam-pipe passes from the top of the boiler to the bottom of this steam-chamber. Directly over this pipe, a dome is fixed, about three quarters the diameter of this chamber; the depth of this dome is rather more than half a sphere, and within two inches of the top of the pipe. From the bottom of the chamber there is also fixed a return-pipe half the size of the steam-pipe, which leads down to within two inches of the bottom of the boiler. The operation is thus: When the steam rushes into the chamber, it takes with it more or less water and foreign matter (this is what is technically called priming,) which strikes the concavity of the dome, and throws down the water and foreign matter to the bottom of the chamber, while the steam in a pure state passes off through the steam-pipe, and the foul water returns to the bottom of the boiler through the return-pipe.

Eleventh Advantage.—The steam is got up much quicker than in any other boiler, in consequence of the great evaporating surface within it, and the diminished quantity of water in the boiler.

Twelfth Advantage.—The construction of this boiler is extremely simple, the bottom plate, after having been perforated with proper-sized holes, female coupling screws are firmly rived into it; the lower half of the tubes, which has been reduced one third in size, about two inches from their ends, is formed into a male screw, to fit the female coupling-screw. This male screw is faced perfectly flat, and the shoulder is made to be screwed firmly in contact with the bottom of the boiler. The upper half is screwed in the same manner. The face of this screw is rounded, so that when it is brought in contact with the flat surface of the lower half, it may be the more certain to make a perfect joint. The upper half is not allowed to touch any part but the flat surface of the lower half of the tube. The plug-nut, which is used for hermetically-sealing up the tube, is perforated in the centre with a small hole,—say one eighth of an inch in diameter, and filled with a fusible metal, which will be driven out before the tube will rend, and which could only take place should the water be allowed to escape from the boiler.

The wagon-boiler is considered the weakest form, but this new boiler is altered somewhat in shape; the bottom is perfectly flat instead of concave; the sides are also flat; the top is semicircular. The female coupling-screws undoubtedly materially strengthen the flat bottom. The boiler is to have tie-bolts from the top, the number of which is to be determined by the strength of the steam to be generated in the boiler; they pass down vertically between the tubes, and are screwed into the flat bottom

distance from it in a state of buoyancy, and there moved freely in every direction. So circumstanced, the water evaporated slowly; but when, by the evaporation of successive measures, and the lapse of time, the iron was cooled down to the "evaporating point," the water then evidently came in contact with the iron, and the augmented rate of evaporation was as 90 to 6, or as 15 to 1, the rate being increased or multiplied 15 times; or, in other words, a given quantity of water was converted into steam, 15 times quicker at a moderately low, than at an intensely high heat.

* It is a curious fact, that there are now many boilers which have been in constant use for more than fifty years—the cause is, that these boilers are sufficiently large to make all the steam required, without being forced; this is done with a great sacrifice of fuel: but since it became necessary to economise fuel, the boiler has been very much reduced in size and altered in form, exposing many parts to be overheated. It is true, such boilers raise much more steam with the same fuel, and undoubtedly much more is saved in fuel than is lost in wear and tear of the boiler. This is noticed, to show the great advantage of so constructing the boiler that the heat will always be kept down.

of the boiler. Tie-bolts are to be used also to hold the flat sides of the boiler from bulging out when used for high steam. None of the nuts of the tie-bolts are exposed to the fire, consequently no objection can arise from that source. This boiler may be made much stronger than any other, on account of its diminished size; setting aside the absence of any danger from the second and third cause of explosion, which has been described, the ends of this boiler, which are flat, may be made sufficiently strong by ribs. In fact, this boiler must be pronounced a perfectly safe one, since only the first kind of explosion can take place, which is absolutely harmless; the first kind has also been described. The ease with which this boiler can be repaired is not one of its least recommendations. Duplicates of the tubes may always be at hand, and if any give way, from unsoundness or any other cause, they can be readily replaced, as they are fac-similies of each other.

Thirteenth Advantage.—All persons who have been in the habit of using anthracite coal, know that the intensity of its heat is so great, that if urged to its greatest power, the best fire-brick is readily fused. It is on this account that it is so difficult to be used for raising steam; still, some careful stokers have used it to great advantage. It is, however, done at a great sacrifice of heat,—for slow combustion and thin firing only will answer. To produce the greatest effect, rapid combustion with a deep fire is necessary. In the new boiler, the heat cannot possibly be too great. This coal, which is called in Wales, stone-coal, may be obtained there in any quantity, and is undoubtedly the most economical where it can be used, as is the case in this boiler.

From the London Mechanics' Magazine.

ENGLISH AND AMERICAN STEAMERS—AVERY'S ROTARY ENGINE.

Sir,—I should feel obliged for further information, through the medium of your Magazine, from some of your many American readers, relative to Avery's recoil engine, and also a New-York steamer, mentioned in the *Encyclopœdia Metropolitana*, the De Witt Clinton.

The cylinder of the De Witt Clinton is 63 inches diameter; 10 feet double strokes; evolutions 26 per minute; effective pressure, 12 lbs. per square inch on the piston —323 real H. P. Is it not a mistake to call it 646 H. P., as nothing is said of two engines, and one is more powerful than any at work in England *at present*. The Radamanthus is 220 nominal H. P.; has two engines; 55 inch cylinders; 10 feet double stroke, 20 per minute going together with low steam; say effective pressure 10 lbs. per square inch on piston—about 290 real H. P. The De Witt Clinton draws only 4 feet 6 inches water, and ought to be impelled by one such engine faster than any sea-going boat in Europe, at least before the wind. Four valves are mentioned 17½ inches in diameter; the number required for a double-acting engine. How are these managed with 20 lbs. steam per square inch on the safety valve? That the thing is well managed in America I doubt not; the load must be near three tons on each of the steam valves, unless they are balanced as in Watt's plan, or made like Hornblower's double-seated valves, such as are used in Cornwall; or Tredgold's packed cylinder modification; or according to some other similar plan. The expression, "steam 20 lbs. per square inch on the safety valve, *expanded inch cylinder*, 10 *lbs. average*," I presume means steam 20 lbs. per square inch on the safety valve expanded in the cylinder to 10 lbs. average. The engine apparently works expansive—how much is the question? Do the Americans usually follow their Consul's example, as given in the *Edinburgh Review*, and divide the lbs. per square inch on the safety valve for expansion? In this case, I shall assume 30 lbs. pressure on the piston per square inch; expanded, perhaps, to 22 lbs.; rather high for condensing. Or, is the steam cut off at one third? If so, this would give 10 lbs. per square inch pressure, or 4 lbs. below atmosphere, at the end of the stroke, or an expansion of three times, and an efficiency of gross power of about 18¾ lbs. per square inch on the piston. But this would scarcely produce 12 lbs. ditto effective pressure; while the first plan gives rather too much. A corrected statement would oblige, and is requested.

The following estimate was made on the first appearance of the account of Avery's engine, for a gentleman who had some idea of erecting one to work a small circular saw, to cross cut borrel-staves, &c. All

the difficulties of the quantity of fluids issuing from a given aperture, at a given pressure, are avoided; as the estimate is founded on the possible effective power which can be produced by the fuel used. Both the weight of the fuel, one half of wood, and the time of consumption, must be assumed in consequence of the defective account. In mining engines, 24 hours is a day; in manufactories, sometimes only 12 hours, which I assume; and, taking half a load as half a ton is 1,120 lbs., and *oak* to coal being (see Engineers' Pocket-Book) as 1,089 lbs., to 1,120 lbs., the fuel is equal to 618 lbs. of coal, and 7 lbs. of water evaporated per lb. = 4,326 lbs.; say 70 cubic feet of water. The steam in lbs. per square inch, on safety valves, is 80 lbs. atmosphere 94$\frac{3}{4}$ lbs. pressure; = to 23,500 lbs. do, on the square foot, + 310, about the volume of steam due to one of water (see Tredgold) at 6$\frac{1}{3}$ atmosphere, then we have 4,185,000 lbs. + 70 = 282,950,000 lbs., one foot high efficieney for 12 hours = 39,300 —, 1 atmosphere wasted = 32,750 lbs. 1 foot high per minute. Taking however two fifths of this for effective power for 12 hours, for half a load of oak wood. It appears from Dr. Davies Gilbert's investigation, that the effective power can, in no case exceed half the efficiency; and that, for this, the velocity of the motion of the aperture, at the end of the arm, must be three fourths of that due to the steam pressure, or a velocity about equal to a common shot. The velocity of 37,660 feet per minute is not half that which is most effective; though it must be admitted that four hundred and twenty miles per hour is *considerably fast.* The American engine seems just within the limits of possibility, since the power is five times that assumed by Mr. D. Gilbert, and the velocity so much less, that iron arms may be just enabled to withstand the centrifugal force. More facts of work performed are requested. The principle of recoil is the first known application of steam power, though for useless purposes; but the execution of *duty* will reflect credit on American ingenuity; the more so from the well-known and frequent failure of similar attempts in Europe. The advantages of expansion, however, must be abandoned, even if Avery's engine should chance to rival the *common* high pressure engine, not worked expansively.

How to observe requires an observation, and deserves more. The distinction between steam pressure and steam in lbs. per square inch, on the safety valve, should be attended to (the gross pressure in the cylinder, as well as the effective ascertained is known). This is equally required for high pressure engines, since the wasted atmosphere is one-third of the efficiency or gross power of steam of 30 lbs. per square inch on the safety valve, and one fifth of steam of 60 lbs. ditto; and, in all cases, if worked expansively, it should be stated at what part of the stroke the steam valve is closed. Believing that many American steamboat engines, (from various hints, however, rather than statements) are worked expansively, I am desirous of information as to what extent expansion is there in practice carried, when acting against an uniform resistance.

Yours, &c.,

E.

—— Mines, Cornwall, Feb. 16, 1836.

VISIT TO THE QUICKSILVER MINES OF IDRIA; IN A LETTER FROM AN OFFICER IN THE AMERICAN NAVY.

You know I travelled through Germany as a pedestrian—a mode of travelling which I would recommend to others through that interesting country.* You must imagine me then on the second day of my journey, from Trieste to Vienna, in a region thickly settled and well cultivated, and with a mixture of hill and dale sufficient to make it highly picturesque. An old countryman with whom I stopped to converse about noon, informed me that by taking a crosscut over the country, I should make my road to Idria much shorter than by following the highway, and as I am fond of by-ways I received his information with pleasure, and soon after struck into a wagon track, to point out which to me, he kindly left his work. The wagon track, after leading me through some retired villages, dwindled into a foot-path, and even this soon after disappeared and left me alone among the hills: but a lover of nature is never solitary, and particularly with such varied and beautiful

* We most heartily second the writer's recommendation. For health and information no mode of travelling is equal to it, and what is of more importance to some, it is fashionable in Europe just now.

scenery as almost every step opened to view. I am strongly tempted to describe some parts of it, and also the simple and hospitable manners of the people—but this would not be exactly suited to a Journal of Science. The country towards evening, became a constant succession of steep rounded eminences, generally of considerable height, and just before sunset, reaching the summit of one of highest, I had just under my feet the pretty little town of Idria. It is situated at the bottom of a deep valley or green, the houses were white, and as the streets have to follow the windings of the green ravines, it has a simple and very pleasing appearance. Near the center, is a conical hill with a church on its summit from which a line of a dozen little chapels, along the side of the eminence, showed the course of the Via dolorosa—sometimes an appendage to papal churches. A stream of water about forty yards in width, dashing along the bottom of the valley, and several of the excellent German roads, running zig-zag up the steep ascents completed the view. At the entrance of the village my passports were examined, and the officer having ascertained that I wished to examine the mines said he would send a person to accompany me. Accordingly, a sergeant soon after called at the public house where I lodged, to say that the mining operations were carried on day and night, and that I could enter at any time: I had noticed from the hills a dark crowd of men in front of a large building, and those he told me, were the evening gang about commencing the descent. I appointed 6 o'clock in the morning, and on waking, found him waiting for me. At the building alluded to, which is on one side of the village, and covers the netrance to the mines, we changed our dresses, ane the keeper unlocking an iron gate, we found ourselves in a horizontal gallery three or four hundred yards in length, running directly into the hill, at the foot ol which the edifice is created. Here we came to a small chapel with a light burning before the picture of the virgin, and turning short to the left commenced the descent. It has nothing difficult, being effected the whole way by means of stairs in pretty good order: indeed, the mines have nothing corresponding to the ideas of terror which we are apt to connect with such places, except the atmosphere, which throughout the mine, must be strongly impregnated with mercurial vapor, and is constantly producing salivation among the workmen. Having descended by seven hundred and twenty-seven steps, reaching to a depth of one hundred and twenty-five fathoms, we arrived at the region where chiefly the cinnabar is procured. The mining operations are carried on principally in galleries, the friable nature of the ground or rock seldom admitting of larger chambers. The cinnabar is in strata of from two to six inches in thickness, and of a variety of colors from dark to light red, the quicksilver sometimes being mixed with it, sometimes occurring in the intervening strata of earth or stone. Sometimes the cinnabar is of a brilliant red, and once I found it in small crystals, but such specimens are rare: generally it is of a dull red color, and the stone is so brittle that nothing more than a pick-axe is required. The strata affording the quicksilver appeared to have no particular direction, and occupy about one third or one half of the entire mass of rock. Proceeding a short distance, however, we came to galleries where the cinnabar is less common and the quicksilver is the chief object of search. It occurs here sometimes imbedded in a friable rock, sometimes in a kind of earth, in appearance and hardness resembling talcose slate, but principally in the former. Generally, it is in particles too minute for the naked eye, but often when the rock is broken, small globules present themselves, varying from a size just large enough to be seen, up to that of a common pin's head. These globules are not distributed at random through the mass, but the substance in which they occur forms strata usually about one inch or two in thickness.

Descending still lower, we soon came to the richest part of the mine. Here the *gangue* consits almost entirely of the talcose earth mentioned above, and the globules are so large that when it is broken, they fall out and roll to the bottom of the gallery. The laborers here are relieved every four hours, being unable, from the state of the atmosphere, to work longer than this at one time. In the other parts of the mine they work eight hours. There are three hundred and sixty altogether employed in the mines, divided into three companies, and working, each, eight hours out of the twenty four; their pay is only from 15 to 16 kreutzers

(12 to $13\frac{1}{2}$ cents) per day, the usual pay of day-laborers throughout Germany. I found several of them suffering from the effects of the mercury.

Having loaded myself and the guide with specimens, I returned by the same way to the upper mine and proceeded next to examine the washing rooms, which are situated a few hundred yards from the mines. The *gangue* containing the metal is carried to this house, and if it is of the earthy kind, it is broken up and thrown upon large seives, by means of which the loose or native quicksilver (called here yung frau or virgin quicksilver) is separated from the earth: the latter is then cast into shallow boxes open at the ends and a little inclined, and a gentle stream of water being made to pass over it, a rake is used, and the earthy matter is carried off. There are seven of these boxes in succession, and by the time the residuum reaches the last of them, it resembles a heavv gray powder, and is sufficiently pure to be carried to the vapor furnace. The stony fragments require only a slight washing to cleanse them from the outward earthy impurities.

The furnace is half a mile lower down the valley and at the extreme end of the village. It consists of a circular walled building about forty feet diameter by sixty in height, on each side of which is a continuous range of chambers ten or twelve feet square, and nearly as many in height: by means of small square openings in the partition walls, the air is allowed to pass from the centre building to the remotest. Each has also a door communicating with the external air. These buildings are all of stone and are plastered within. The *gangue*, after being prepared in the washing house as already described, is removed to this edifice and placed in earthen pans four inches deep and fifteen in diameter, which are piled up so as to fill the centre building. The doors of the chambers are then carefully walled up; and a strong fire having been lighted under the centre building, the quicksilver rises in the form of vapor, and passing into the small chambers, is there condensed by the cold atmosphere around them. Some of the gangue, you will observe, is brought here in the form of the native rock: I understood them to say that the expansive power of the vapor, together with the heat of the fire, was sufficient to cause the rock to disintegrate and thus allow the escape of the quicksilver. When this process is over, the door ways of the chambers are once more opened, and the quicksilver, which is found chiefly adhering in drops to the sides and ceiling, is scraped off, and running into a hollow in the floor, is taken thence to the cleaning and bottling room. It appears to act on the mortar of the chambers, for I found the latter flaky, and the crevices all filled with small globules.

The cleaning process is very simple, a piece of canvass being merely spread over a funnel, and the quicksilver being made to pass through this, comes out sufficiently pure. That intended for home consumption is then tied up in sheepskins, while that for exportation is put in iron bottles large enough to contain sixty-eight pounds. The furnace is kept in operation only during the winter months, and then the vapor which escapes from it is a serious annoyance to the town: they have a blast three times every fortnight.

The price of quicksilver at the mines is 112 florins for one hundred German pounds, or about 44 cents for an American pound. The quantity annually procured is about one hundred and sixty-four tons: formerly it was greater, and brought a better price, their market, which is chiefly in China, having been injured by competion from the quicksilver mines near Almeria, in Spain. —[Am. Journal of Science and Arts.]

From the Annals of Education.

EDITORIAL CORRESPONDENCE.

Coblentz, on the Rhine, Nov. 26, 1835.

Unexpected circumstances of a private nature, have made it my duty to visit Switzerland at a season which is not favorable, and the facilities offered by steamboats on the Rhine, led me to choose that route. But I find myself amply repaid for all the "disagreeables" by the interesting character of the scenery, compared with the monotonous, wearisome roads of France; and, above all, by the gratification of my own taste, on this classic ground of education.

In travelling through Germany, one who is interested in education meets continually with kindred spirits. In consequence of the share which the government takes in education, it is not so frequently a trade.

There is less of private speculation, and the little jealousies and narrow views to which it gives rise. The wise measures of the government have also had the effect of making education a profession, both honorable and lucrative—and of inviting men of talents and eminence to devote themselves to it. As a necessary consequence, it has called up the attention of all who cultivate their minds, much more than in other countries; and you will find most men of intelligence familar with principles in daily use, which are regarded as idle theories by not a few of our teachers.

It is not less striking to a stranger, to find men of all professions who speak so decidedly as to the necessity of religious school instruction. But I must reserve this topic for a separate article, in order to do it justice—I will only remark, in passing, that they consider our practice on this subject as equally *unchristian* and *impolitic*; as preparing our way to the grave of free nations; as increasing the spirit of licentious liberty to such a point that we shall be obliged to admit, if we do not demand, a military despotism.

To one who feels that on the education of the young depends the destiny of his country, and all the objects of affection it contains; who believe that the progress and the extension of improvements in education is the only means of enlightening and civilizing and christianizing the world, it is truly cheering to find some of the most eminent and able men of church and state, devoted to the single duty of studying and examining—of making experiments and ascertaining results, in this "science of sciences"—men too, who know and feel, that such a term involves no exaggeration, and indicates no peculiar professional or personal enthusiasm. It is even gratifying to find, that such men, occupied exclusively with a subject, which has been regarded as too inconsiderable, or too uninteresting to require an *entire periodical*, and eager to communicate every information to an inquirer, are obliged to reflect, and make special arrangements, before they can devote a few hours to a stranger.

In passing through Cologne, seven years since, I visited the school Inspector of that district, and found him in the midst of a mass of papers, assisted by a secretary. He received me with great kindness, and gave me such documents as would aid me in my inquiries; but as my stay was short, he could not lay aside or arrange his occupations so as to allow me much time for conversation. In my present hurried journey I was unable to call upon him.

At Neuwied,* on the Rhine—a few miles from this city—I stopped to visit a public seminary for teachers; and here I found several able men whose whole time and power were devoted to study and experiment and instruction as to the best mode of "keeping a school"—a task for which any youth of seventeen, any poor scholar of a college, any one who is unfit for any other profession, is quite competent in our country; and all this care and labor is even wanted on *elementary schools*. When will it be seen that it is a more delicate, a more difficult task to be the teacher of a school of children, than to be a professor in a university? The seminary at Neuwied, I will describe hereafter, when I have leisure to copy and complete my notes.

In Coblentz I found two school officers, who received me with great kindness, and in whom I was much interested. One was a Catholic who has given up his office, but who had just returned from a tour, in which he had assisted in organizing a Catholic seminary for teachers. I could not but wish that some of our statesmen could have seen the spirit with which a man, whom they would not hesitate to receive into their ranks—could enter upon, and speak of this humble, or, as I regard it, this *noble* employment.

The other gentlemen is a Protestant, the inspector of this district. I found him also in the midst of his business—and it was not till he had examined his papers and memorandums, that he could venture to promise that he would see me on that day. He invited me to the evening meal of his family. The opportunity was, however, so precious, that I could scarcely give up any of its moments to that free, social intercourse, which is so characteristic of a German family; and I found so much patience and indulgence with my inquiries, that I was tempted, I fear, almost, to exhaust it. This gentlemen was kind enough to give me, in parting, several interesting pamphlets, and also a copy of some of his observa-

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*This place will be remembered by some, as the residence of Maximilian Prince of Neuwied, who published his travels on the Rhine. He has a fine collection here of American animals.

tions in MS. during his tour of inspection. He has since been so attentive as to send me an elementary work on music, published for the use of Prussian teachers, which I hope will furnish some assistance to those who are laboring on this subject, in our own country.

On the way hither, I met with a very interesting man who has no official connection with education, but who gave evidence of reflection and of interest in the subject which is rare with us, and which was least to be expected in a veteran officer of the Prussian army. In his general views he fully sympathised with others I have mentioned, but on one topic, I found his opinions unexpectedly and fully coincident with my own.

He observed that the Universities were becoming more and more sources of disorder and of "*demagogy*," if I may use the expressive German word. For the first it will be sufficient to say, that a private Musical Society in Heidelberg, was recently assaulted by a band of students, who were determined to enjoy its pleasures uninvited, and that on their being repulsed, they resorted to the war-cry of the University, ("*Bruschen heraus.*" Out students!) rallied the whole body to revenge the pretended injury, and produced a mob which resulted in some serious, if not fatal wounds. For the last, it is only necessary to allude to the fanatic assassin, Sand.

"And how," replied I, "can you expect it to be otherwise on the present plan? You keep your sons under the paternal roof, in the midst of all the restraints of social life, and family endearments, until the age when the passions just begin to assume their *greatest strength*, and reason is too immature to govern them; and then send them forth *unattended*, *unrestrain d*, and in their private life almost unobserved, in the midst of others as immature, and as ardent as themselves! How can any man who knows human nature expect any other result, than that the young seaman who is launched for the first time on a stormy ocean, and without a pilot, should lose the command of his helm? Happy if he escapes shipwreck! For myself, continued I, I regard this very course as a source of ruin to a large number of our young men." "You are right," was his reply; and he went on to express his own views with great force and clearness. I have not time to give you the details. He added, that for this very reason he had not suffered his own sons to leave their home until they were twenty-two years of age. Would that some of our American parents would adopt this course, even partially. It would save many a melancholy shipwreck of character and hope—it would save many a parent's heart from "*the anguish of death.*" Sad error, to plunge a youth into temptation before he has learned to resist it,—to hurry him into the duties of life before he is competent to perform them!

Hofwyl, Dec. 19, 1835.

In conversing with gentlemen interested in education in Germany and Switzerland, I have uniformly found the most painful surprise, that a nation so enlightened, and generally considered so free from the corruptions of the old world, as the United States of America, should have any doubts on the great question, whether it is a duty of the State to see that *every child actually receives instruction*, and is thus made capable of knowing, and of doing his duty as a citizen; and whether religious instruction ought to form a part of the course of every elementary school.

The uniform remark is, that it is impossible our institutions can be permanent—nay that they can long exist, unless they are sustained by intelligence and virtue in the people, a principle which was long since announced by the "Father of our Country"—and this, without universal instruction,—without thorough—early religious instruction, they believe it is idle to expect. They say that our very prosperity increases our danger—that all this material and pecuniary power, if it be not directed by a higher degree of cultivation, extended to all the people; if above all, it be not guided and restrained by moral principle, deeply fixed, and firmly based on religious truth—will only produce among us, in another form, that absorption in material things, that sensuality which destroyed every vestige of liberty and greatness in the Mistress of the world. They see in this neglect, the sources of those disorders which now render us the objects of pity, even to the subjects of despots in Europe, and as friends of mankind, and, many of them free governments, they tremble at these bodings of

moral ruin, where they imagined an asylum of liberty and virtue.

They hear with surprise that the jealousy of those sects, which differ only in a few points which they generally admit are not essential, should be suffered to prevent religious instruction. They ask how it is, that with so much light, and so much of the spirit of religion as we possess, such narrow feelings can be allowed to interfere with so important an object. They are still more astonished to learn, that this jealousy frequently forbids even instruction in the history of the bible. But they ask—"Will not your pastors, then, supply this defect by regular lessons, as is done where our villages are divided in religious opinion?" and their astonishment, is, if possible, increased, to hear that *Christian parents*, and *Christian pastors*, who think it desirable that their children should spend six hours daily—the *best*, if not the whole time which they are capable of spending in intellectual effort in acquiring knowledge which is bounded by this life and its material objects,—and this for six days in the week—should consider it sufficient to devote one day only to those subjects which are equally necessary to their character and happiness here, and to that eternal life which is to come.

We need not say that we can offer no adequate apology for this inconsistency with other principles and professions; that we can give no reason but those of habit, and prejudice, on which the abuses of the old world are founded, and which we treat with so much contempt, when they are referred to, in justifying or excusing institutions and measures which are unlike our own.

Mr. D. K. Minor,

Sir,—I send you the following receipts for the Mechanics' Magazine, thinking they might be of some service to some of its readers. S.

For painting Mahogany and Curled Maple.—For mahogany, give the work a coat of straw colour, made of white lead and yellow ochre; when dry, give a light coat of Venetian red, and burnt terra de sciene, equal parts, and spread very thin. The grain should be put on by a flat brush; some of the dark shades may be made with burnt umber and black, ground together, and applied with a camel's hair pencil. If any part is to be made very light, the straining may be wiped off with a ball of cotton, light stripes may be made by drawing a piece of earth over the work, and taking off the dark color, &c.

For Maple.—The work stained with yellow ochre and burnt umber, or terra de sciene unburnt, ground together, but as it varies so much in the color from yellow to brown, it may not be depended on uniformly. The bird's eyes and curls are formed by removing the staining with a piece of stiff leather, with the edge cut in notches, so that several of the points will touch the work at once, or the ends of the fingers may be used instead of the leather.

To imitate Tortoise-Shell.—Make the ground dark with Venetian red, rose pink and lampblack, it will make a dark reddish brown, then take a coarse sponge, wet it with water, dip it in Venetian red, ground fine in varnish, dot it on the above ground, then take rose pink, and give it a coat over the whole.

A Varnish for India Rubbers.—Half a pound of gum shellac, one quart of spirits of wine, and two ounces of Venice turpentine, dissolve the gum in the spirits, then add the Venice turpentine, the gum should be dissolved in the spirits, set in warm water or hot sand with the cork put lightly into the bottle.

To the Editor of the Mechanics' Magazine.

Sir,—"When a heavy body is made to revolve in a circle, it has a tendency to fly from the centre, and this tendency is called its centrifugal force. An ounce ball attached to a string and whirled around horizontally, in the manner of a sling, may easily be made to break the string, even though it is strong enough to sustain the weight of four or five ounces; that is to say, the centrifugal force may easily be made to exceed four or five times the weight of the ball. The fundamental rule for comparing this force under different circumstances, is the following:—

1. The centrifugal force of bodies, revolving in a circle, is in proportion to the weight of the body multiplied into the square of its velocity, and divided by the diameter of the circle.

In the comparison of bodies revolving in circles with an *uniform velocity*, the following rules hold good, and are easily deducible from the preceding one.

2. If the weight and velocity of the bodies and diameter of the circles be the same, the force is the same in all points of the circle.

3. The centrifugal force is in proportion to the weight of the body multipled by the diameter of the circle, and divided by the square of the *periodical* time: that is to say, the square of the *time taken to make one revolution.*

4. The centrifugal force is in proportion to the weight of the body, multiplied by the diameter of the circle, multiplied into the square of the number of revolutions made in a given time.

5. The relation between the centrifugal force of a body, its velocity, and the diameter of the circle in which it revolves, is such, that the body would acquire its velocity, by falling, under the action of the force, through one fourth of the diameter of the circle.

By the assistance of this principle, we can easily measure the centrifugal force of bodies, provided we assume some known force as the *unit of force*, as in measuring distance we assume some known unit of length, a foot or a yard. The most convenient standard we can adopt, is the force of gravity at the earth's surface, because it is perfectly well known, and is in proportion to the weight or inertia of the body, as centrifugal force also is. It is required, then, to find the diameter of the circle in which a body must revolve once in a second, in order that its centrifugal force may be just equal to gravity at the earth's surface.

Let D= diameter required, C= the ratio of the circumference of a circle to its diameter=3.1415926—S=the height from which a body falls in one second=193 inches. Since the body by supposition revolves once a second, its velocity per second is $=D\,C$; and by the last rule, this is acquired in falling through D-4 under the action of the centrifugal force, which by supposition is gravity. Now by the laws of gravity, a body falling through S, would acquire a velocity of 25 per second, and the velocity acquired is in proportion to the square root of the space fallen through, therefore $D.C : 2S : : \sqrt{\frac{D}{4}} : \sqrt{S}$, squaring all the terms, we have $D^2.C^2 : 4S^2 : : \frac{D}{4} : S$; by multiplying extremes and means, we get $S.D^2.C^2 = S^2.D$; dividing by $D.S.C^2$ gives $D = \frac{S}{C^2} = \frac{193}{3.1415926^2} = 19.554$ inches, the diameter required.

Having ascertained this circle, let D= diameter of any other circle in inches—t= time of the body's revolution in that circle—G=force of gravity—to find F, the centrifugal force of the body.

By comparing this circle with the one whose diameter is 19.554, according to the third rule above stated, we have $G : F : : \frac{19.554}{12} : \frac{D}{t^2}$ multiply extremes and means, and $\frac{G.D}{t^2} = F \times 19.554$, and since we make gravity the unit of force, G=1, therefore $\frac{D}{t^2 \times 19.554} = F$, which expressed in words gives the following rule.

6. Divide the diameter expressed in inches by 19.554 times the square of the periodical time expressed in seconds, and the quotient will be the centrifugal force, gravity being one. For example, if a body revolve once in two seconds, in a circle whose diameter is eight feet, its centrifugal force will be 1.227 times its weight for $\frac{96}{2^2 \times 19.554} = 1.227$.

By comparing the centrifugal forces in these two circles, according to the fourth rule above stated, we have the following:

7. Multiply the diameter of the circle in inches, by the square of the number of revolutions per second, and divide the product by 19.554, and the quotient will be the centrifugal force, gravity being one. For example, if a body revolve three times per

second in a circle of ten feet diameter, its centrifugal force will be 55.23 times its weight, for $\frac{120\times 3^2}{19.554}=55.23$. And from the first rule above stated, we adduce the following:

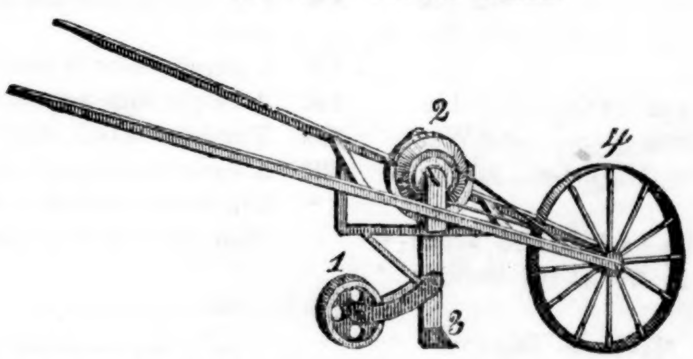
8. Divide the square of the number of inches which the revolving body passes through in a second, by 193 times the diameter in inches. Thus, if a body revolve, in a circle of ten inches diameter, at the rate of nine feet a second, its centrifugal force will be 6.043 times its weight, for $\frac{108^2}{193\times 10}=6.043$.

These rules suppose the body to be reduced to a point, and that the diameter of the circle described by that point, is known. This imaginary point is not the centre of gravity of the body. The rules for ascertaining it, in all cases, with mathematical precision, are exceedingly complex, and not within the design of your magazine; but with your leave, Mr. Editor, I will in some future communication, give the methods of ascertaining it in the simpler cases, and a method of approximation sufficient for all practical purposes.

Respectfully yours,

GYAS.

BEMENT'S TURNIP DRILL.



MR. MINOR,--There is scarcely any part of the extensive and important science of agriculture that has received greater improvement within these few years, than that relating to the construction of farming utensils.

Among the great variety of different implements which have been presented to the attention of the farmers, some, as may be readily conceived, have appeared, that are evidently much too expensive and complicated in their construction, for the purposes intended; and others, probably from a want of practical information in the inventor, have not been properly adapted to the uses for which they were designed; but in general they have been such as have contributed much to the present very improved state of the art.

The first drill machine was invented by a German, and presented to the Court of Spain, in 1647; but it appears, from a communication to the Board of Agriculture in Brittain, that a sort of rude drill or drill-plough has been in use in India from time immemorial.

"In the construction of all implements of this sort," says Dickinson, in his Treatise on Agriculture, "the greatest attention should be paid to have them as simple in their construction as possible, in order that they may be used without difficulty by those who have but little knowledge of the nature of such machinery; much care should also be taken to have them so made as that they may perform their work with correctness; that the seeds, of whatsoever kind, may be delivered and deposited in the ground with the greatest evenness and regularity; and that they may not be bruised or injured in any way during the application; as the want of proper attention to these particulars seems to have considerably retarded the progress of the drill system of cultivation."

The machine figured above, is simply a

Turnip Drill, which is nothing more or less than a modification of the Northumberland Drill. It consists of a frame and wheel, fig. 4, with a grooved nave to receive the band, which passes round a pully on the end of the tin cylinder, fig. 2, barrel-shaped, the centre pierced with holes for the seed to escape into a funnel which conducts them to the drill, fig. 3, which forms the rut, and deposits the seed. Fig. 1, is a cast-iron roller which follows, covers and presses the earth to the seed. In using, the laborer pushes it before him, sows and covers one row at a time. From three to four acres in a light soil, placing the rows thirty inches apart, may be put in per day if required. It is very simple in its construction, very light and not liable to get out of repair, and can be used by a boy or any person who can walk on a straight line.

They are manufactured by the subscriber, and sold by him at 82 State-street, and Wm. Thorburn's Seed Store, Market-st., Albany, price $8.

☞ Orders may also be left at 94 Broad street, or at Huxley & Co.'s, 102 Barclay street, New-York.

CALEB N. BEMENT.

Albany, April, 1836.

For the Mechanics' Magazine.

Hardening or tempering steel, (from various authors,) by the employment of the metallic baths, composed chiefly of lead and tin, in different proportions, which pass into fusions at different temperatures, and which can be used for tempering steel, as soon as they arrive at their melting points.

No.	Kind of Tools to be tempered.	Composition of Baths.		Temperature Fahren.
1	Lancets,	7 lead	4 tin	420°
2	Other Surgical Instruments,	$7\frac{1}{2}$ and	4	430
3	Razors,	8	4	442
4	Penknives, &c.,	$8\frac{1}{2}$	4	450
5	Larger Knives,	10	4	470
6	Scissors, Shears, Hoes, and Cold Chisels,	14	4	490
7	Axes, firmer chisels, plane irons, pocket iron,	19	4	500
8	Table knives, large shears, &c.,	30	4	530
9	Swords, watch-springs, &c.,	48	4	550
10	Large springs, daggers, augurs, fine saws,	50	2	558
11	Pit-saws, hand-saws, and some particular springs, — boiling linseed oil,			600
12	Articles which require to be still softer,—melting lead,			612

At 430° the color is pale, and but slightly inclining to yellow.
450 A pale straw color appears.
470 A full yellow appears.
490 A brown color appears.
510 The brown becomes dappled with purple.
530 A purple color is established.
550 A bright blue appears.
558 The color is full blue.
600 A dark blue, approaching to black, has become settled, and is attended with the softest grades of temper.

A.

April 25, 1836.

SQUARING THE CIRCLE.—We have received a communication on the subject of this mathematical bugbear, that demands attention, from the evident desire of the writer to obtain information.

We would advise him, and any one else anxious on this subject, to read the very excellent article published some time since in the Franklin Journal, and so frequently copied, as to be found in every journal treating of such matters.

Our correspondent is informed that the grand question is the relation of the circumference to the diameter; he seems to have got at this but unwittingly.

Various numerical expressions for this relation have been proposed, that of 7 to 22, used by our friend, is the most inaccurate of any—72 are all of course merely approximate, but when a value can be given to 154 places of decimals, very few persons will be so unreasonable as to desire more accuracy for any practical purpose.

The best proportion, and the one most easily remembered, is 113 to 355—this gives for the value of the circumference (the diameter being 1) 3.141.5926, which, as far as it goes, correspond with the value above mentioned, (and if our friend desires, we will give him the whole 154 figures.)

The advantage in this proportion is the great ease in recollecting it—write down the first three odd numbers twice 113 | 355, the three left hand figures represent the diameter, the three right hand figures the circumference.

It is easy to calculate that in a circle of one mile diameter, the error for the value of the circumference, by this proportion would be inappreciable by all ordinary instruments, used in measuring such distances.

G. C. S.

Sugar from Urine.—It has long been ascertained, that the urine of persons afflicted with Diabetes, contained pure sugar. The following account of a loaf of sugar from such a source, shows that the manufacture has increased. Indeed, the sugar would, for cheapness of the *raw material*, rival that either from the beet, cane, or Indian corn; but unfortunately, Diabetes is a disease of rare occurrence, and with the exception of a few local instances, we are convinced that the supply from this source may be considered as absolutely nothing.

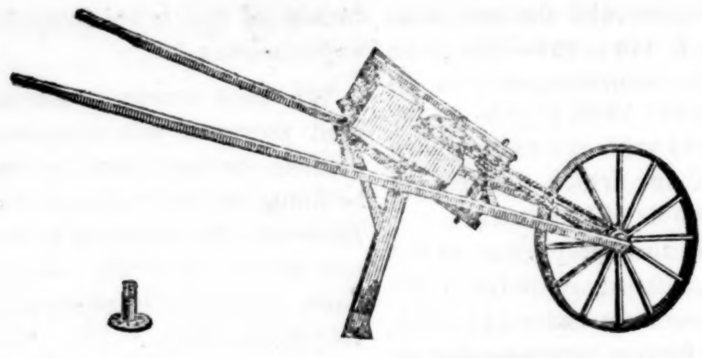
M. Peligot, a chemist, has presented to the *Societie Philomathique* a loaf of sugar, which he had extracted from the *urine* of a patient now in the hospital of *La Charite*, afflicted with the Saccharine Diabetes.—This man voids about 20 quarts of urine a day, of which 5 parts in every 100 is sugar.

SOAP FROM FLINTS.

The following notice of a curious improvement in the manufacture of soap, is from the London Mechanics' Magazine. It will be perceived that the soap proposed is a mixture of common soap and sicate of potass or soda, sometimes called "soluble glass." The writer of the article is certainly mistaken when he speaks of the materials of the latter compound "attaining saporification."

We have strong doubts as to the detergent power of this compound. We must confess our fears, that the compound would be found rather "sticky" than otherwise. However, the experiment is a simple one and worth the trial. No one can have doubt as to the cheapness of such a soap.—Ed. Mech. Mag.

"Wonders will never cease. This Magazine has been the medium of communicating to the public many curious and useful inventions; but making soap from flints we little thought it would have fallen to our lot to mention on this side of the grave. Mr. J. C. C. Sheridan, a native of Belgium, is the inventor of the process, and has obtained for it patents in England, Scotland, and Ireland. It is very agreeable to us to be the first to describe to the public a process so likely to produce a total but highly beneficial revolution in the manufacture of soap. Mr. Sheridan takes the common black flint, calcined, and reduces it to powder by wet-grinding: then mixes it with the caustic soda leys, or potash leys, and boils it till it attains saporification. The mixture so obtained is added to the present soap materials after the latter have been boiled to that state when they have become soap, and are ready to be poured into the frames. The mixture, which has a highly detergent quality, requires to be well crutched along with the soap materials; and when thus crutched together, the result is a soap of excellent quality. The mixture becomes intimately incorporated with the soap materials, and may be added in the proportion of from 40 to 50 parts of the mixture to 50 of the soap materials. Thus the common silex, which is obtainable at a very low price, takes the place of tallow, not purchasable under 40*l.* per ton, to the extent of nearly one-half. This invention, which promises to come into very general use, will have the effect of diminishing the consumption of tallow, and conseqently rendering us, in the production of a staple commodity of the utmost importance to the health and commerce, independent of the great northern Autotocrat.



From the Cultivator.

ROBBINS' CORN PLANTER.

Mr. Buel—Sir :—Having been applied to by letter, from various sources, for a description of "Robbins' Corn Planter and Drill Barrow," and answers to the following questions solicited, I have concluded, with your permission, to reply through the medium of the Cultivator, should you deem them of sufficient importance to occupy a small place in one of your columns.

Question 1*st*. "Is Robbins' machine complicated, and liable to get out of repair?" *Answer*. At first view, it would appear rather complicated; but on further inspection and a trial, the complication ceases, and it becomes very simple. There is, however, but one way of placing the band on the pulley, for that must be turned with the sun; *i. e.*, the band should pass from the top of the nave or hub of the large wheel, to the left side of the pulley or whir. Particular attention should be paid to this, as, by placing it the opposite way, the wire spring in the small circular box might be injured. The band is shortened or lengthened by twisting or untwisting. The speed may be accelerated or retarded by placing the band on the larger or smaller groove on the nave and whir. By increasing the motion of the droppers, the seed will drop faster, and, of course, nearer together.

2*d*. "What and how many kinds of seed will it sow?" *Ans*. It has six droppers, with different sized holes, and will plant corn, beans, peas, broom-corn, beets, mangle wurtzel, turnips, teazles, onions, carrots, mulberry, and all kinds of round or oval seed not larger than corn or beans, with more system and correctness than can be done in the usual manner of planting with the hand and hoe. One man may easily put in five acres in a day, placing the seeds any given distance apart, from two or more inches, and in rows two and a half feet apart one way, and the rows at such distances as may be deemed best. In drills, one or more seeds may be dropped, at eight inches asunder.

3*d*. "Is it drawn by a horse?" No—it is pushed by a man or boy, like a wheel-barrow, but it is much smaller and lighter.

4*th*. "Will it answer for planting corn in hills of equal distances, in squares, over a large field?" Yes, it will plant corn in hills, dropping from three to four kernels at a time, two and an half feet apart; and, by a little experience and attention, being particular on starting the rows, the hills may be placed at right angles, and at equal distances.

5*th*. "Will it regulate and drop any required number of seeds?" Yes, by using larger or smaller sized droppers.

6*th*. "What is the price?" Fifteen dollars.

To plant one acre of ruta baga, the rows twenty-seven inches apart, and the seeds in the drill one inch apart, only from four to six ounces of seed is required.

In a letter from a gentleman who has had one of these machines in use for several years, I find the following observation, which I have taken the liberty of transcribing:—

"The corn I planted with Robbins' machine, last season, on my farm, exceeded that planted with the hoe, by the acre, at *least fifteen bushels*, under circumstances equally favorable, as to soil and cultivation. And I have conversed recently with a number of gentlemen who have used the mathine, and tried some experiments, and find that the result has been in favor of the machine in all cases, they think, *not less* than *ten* bushels."

Such is the description and character of "Robbins' Corn Planter and Drill Barrow," and I know of nothing wanting to make it perfect, except a roller, which I consider of very essential service to cover and press the earth on to the seed, which causes a more rapid vegetation. The roller may be attached by an additional expense of two dollars.

The above machines may be obtained at the seed store of Wm. Thorburn, No. 347 North Market street, and of the subscriber, No 80 State street, Albany.

C. N. Bement.

Albany, March, 1836.

LOWELL, MASSACHUSETTS.

No. II.

By Henry Colman.

It is exceedingly curious and interesting to observe how closely associated are all the interests of society, interlocking each other in every direction, like a thickly woven web, of the most complicated texture, and united by a common, reciprocal, and indissoluble dependence. How much it were to be desired that men could better understand this; and see that the just prosperity of one branch of business is in a degree the prosperity of all; that there can in fact be no long and permanent monopoly of the great advantages of social life; that success and prosperity in any particular department of business have a tendency to diffuse themselves like the great elements of nature; and that the gains of any one man in the various connexions, fluctuations, and ever varying relations of society, become ultimately the gains of all.

There have been times, when men, under the influence of mistaken views, possibly, in some cases, under the influence of corrupt motives, have endeavored to excite animosities and prejudices among the commercial, manufacturing, and agricultural classes and interests. Now nothing could be more wrong in respect to each of them; and though government may sometimes adopt a partial policy, an unjust system of favoritism, granting peculiar privileges to some, to the prejudice or exclusion of other interests, yet it must be admitted as a great and incontrovertible principle, extending itself through every department of society, through all its multiplied ramifications, that the welfare of one part is the welfare of all; the prosperity enjoyed by any one portion, necessarily reflects its light upon the rest; and that any long continued and exclusive appropriation of any of the great advantages of life is no more possible than a continued and exclusive appropriation of light, or air, or water.

The mutual and reciprocal benefits to be derived from Agriculture by Manufactures, and from Manufactures by Agriculture, may be illustrated by a recurrence to some of the statistical details of some of the Lowell Manufactures, as published in a tabular sheet on the 1st of January, 1836. We shall recur to them by way of illustration, premising only that our remarks must be brief; and that we are without the means of illustrating the truths with which we set out, so fully in detail, as we otherwise might have done.

The Manufactures at Lowell then, have collected a population of nearly twenty thousand in a spot where formerly there were not twenty individuals, all of whom are more or less concerned in, and all of them to a great degree entirely dependent on, the success of these Manufactures for employment, subsistence, and comfort. They are withdrawn from other pursuits, many of them from Agricultural labor, and they are to be supported by the products of Agriculture; for bread and meat must come from the earth. Being withdrawn from Agricultural labor, they render that labor more valuable; and congregating in this way, they consume more of the products of labor, than if they were scattered in the families to which they belonged. Besides this, they have introduced a large amount of foreign population, by whose extraordinary skill and labor we are greatly benefitted and vast public improvements are effected; and whose subsistence of course creates a new demand and market for the products of Agriculture. These effects are strongly perceptible in the immediate vicinity of Lowell; and a ready and high market is found there for all kinds of Agricultural products. This is certainly great gain to the farming interest; and valuable, not solely from the immediate profits, which it now yields, but from the inducement and stimulus, which it gives to improvements; and to a more extended and productive cultivation. There is another mode in which the cause of Agriculture here is indirectly but greatly benefitted. Much of the wages received by the laborers in these factories is remitted to friends at home; perhaps to extingush mortgages or incumbrances on the family estate, or to aid in improving the domicil.

Separate from the products of Agriculture consumed in the subsistence of the operatives of those establishments, let us look at some of the items of those articles which are used immediately in the process of the manufacture. Of cotton, 13,676,600 lbs Of wool, 1,600,000lbs. Of wood 4690 cords. Of starch, 510,000 lbs. Of flour, for starch in the mills, printworks and bleaching, per annum, 3,800 barrels. Of charcoal, per annum, 500,000 bushels. Of Teasels, 3000,000. These amounts are

certainly enormous; and when added to the bread, meat, vegetables, hay, oats, corn, milk, fruit, &c., &c., necessary for the consumption of the human machinery here employed, it is easy to see what demands are made upon agriculture for the supply of them; and what quick and profitable returns the supply of them brings back to the farmer.

The power of machinery is another circumstance that strikes one with astonishment on visiting these places. Operations which it would require years to accomplish by any other process, are here accomplished in a day. Operations which the combined power of a thousand men, could not effect, are here performed under the superintendence of a child. Operations which human power, singly applied, could never effect, are here daily and hourly effected by the simple revolution of a wheel or the pressure of a lever; and all this, with an exactness and precision absolutely perfect, I may properly add, sublime. Of the increased value given by manufactures to the raw material, and of the perfection to which the art is carried, I may be allowed to quote an example from Dr. Ure, in his treatise on the cotton manufacture. Such, he says, is the exquisite nature of the machinery in Manchester, England, that a pound of cotton is capable of being spun into 350 hanks; in which case, the yarn produced by it would extend 294,000 yards, or 167 miles; and that which, in a raw state, cost 3*s* 8*d*, sterling, (this remember, after paying the planter, the merchant, the freighter, &c., &c., an ample profit,) after being thus manufactured, would be worth twenty-five guineas.

The prejudices existing against machinery are fast losing their hold upon all reflecting minds; and its advantages upon *their* condition are becoming far better understood by the common laborers. Whatever tends to abridge the severity of human toil, and to abate the necessity of such an expenditure of human power, as is both wearing to the spirits, and destructive to human life, must be a general benefit. Whatever multiplies to an almost universal diffusion, not only the comforts,but even the harmless luxuries of life,whatever leave men more time to apply to the high purposes of intellectual improvement, or to innocent social enjoyment, must be a blessing. If the man who causes two blades of grass to grow where but one grew before, is to be pronounced a public benefactor, certainly he is not less so, who will cause four to grow with no greater expense of labor than the production of 1 blade formerly cost. Threshing machines have been, in some cases, the victims of popular resentment and frenzy; but there would have been equal reason in tearing down every blacksmith's shop in the kingdom,and breaking to pieces every plough and spade; for the plough and spade are equally machines; and as great advances upon the earliest instruments of tillage, as the threshing machine over the common flail. If the threshing machine debars some persons from their accustomed business, it relieves them from their accustomed toil; if it makes their labor less valuable, it renders their bread less dear; if it closes one source of income and subsistence, it leaves them time, strength, and opportunity to make choice of others. If the stick or the shell, or the improved machine, the spade, must be brought back to take the place of that admirable contrivance for saving human labor, the plough, then must nine tenths of the land, now in tillage and productive, be thrown out of cultivation; the means of human subsistence be in proportion diminished, and the price of what is produced enhanced. In *time*, as we have already remarked, an immense deal is gained; that is now accomplished in a single day, which formerly, years of patient and severe toil could not have completed. I know that cupidity and avarice may still lay claim to all this time, which machinery saves; bnt this does not necessarily follow; for wages are not reduced; and though the means of subsistence are increased the power of procuring it is proportionally extended; and unless men choose voluntarily to surrender their time, they can save much for rational enjoyment and improvement. I know, too, that there are those, who are disposed to tax human strength to its utmost limits under the pretence that men would abuse their liberty if they had more leisure. Many, undoubtly, would abuse it; but this is not a necessary consequence of such a relaxation; and while libraries, public lectures, books of general and useful knowledge, are so much multiplied, and means of improving, and innocent amusement are also multiplied, the danger of such abuses is daily lessened.

Let us remark in the next place, how, by

means of improved machinery, the comforts and innocent luxuries of life are diffused. I am disposed to call elegance of dress, for example, when it is such only as befits our circumstances and means of expenditure, an innocent luxury. We have certainly high authority for regarding it with favor; for what is more beatiful, gay, splendid, variegated, brilliant and gorgeous than the flowers of the field; the scales of the reptile; the shells of the crustareous tribes; or the plumage of the birds? Now, how are these innocent luxuries multiplied and placed within the reach of all the industrious classes of the community; so that the most humble dwellings are often decorated with an elegance of furniture, which not many years since, the wealth of palaces could not have purchased; and the dress worn by many of the laborers in these establishments, and paid for too, by their honest industry, before it is worn, is such, as in times not far gone by, princesses of the realm would have envied. A pair of silk stockings, presented by the French Ambassador, to Queen Elizabeth, was a rare possession, to be brought out only on extraordinary occasions; and deemed a magnificent present. A taste for dress I know will be condemned by many ascetic and severe moralists. Pride of dress is, indeed, always contemptible; and can only be excused through want of understanding. But a strict care of the person, and a particular care of the dress, alike in respect to its neatness, propriety, and elegance, will be found not a mean auxiliary to purity of sentiment, decorum of manners, and innocence of conduct. Vulgarity and slovenliness of dress, and utter disregard of personal appearance, especially in the young, is too often but an index to grosser neglects, and the harbinger of moral delinquencies. Every thing on the other hand, which contributes to promote self-respect, increases a sense of the value of character; and a high sense of the value of character is one of the greatest securities of virtuous conduct.

There is another good, resulting from the modern improvements in machinery, which is not immediately obvious at first sight; but which is certain, and deserving great consideration. Much has been said of the division of labor; and the perfection to which by means of it, the arts have been carried. This has been illustrated by a reference to the manufacture of a pin, which passes through various processes, each requiring or employing a different artizan. The same things occur in various other manufactures. The effect has heretofore been that one person has been confined for life to a single, minute operation; and that, most probably, an uninteresting one; and requiring in order to its expert practice a long and tedious apprenticeship. Such is, in many cases, the improved character of the machine employed in various operations, that the machinery itself, with a self-directing and self-adjusting power, performs many operations at one and the same time; and with a precision which the human hand or eye can scarcely be expected to attain and preserve. This is particularly illustrated in the whip and card manufacturing; and this is a great gain to humanity and a general benefit; since many operations, which were very trying to the health and spirits, which required long practice and intense application, are now performed by machinery under the superintendence of a child, after, it may be, a week's, or a month's instruction. H. C.

March, 1836.

From the London Mechanics' Magazine.

SELECT COMMITTEE OF THE HOUSE OF COMMONS ON ARTS AND MANUFACTURES.

(Continued from page 185.)

MINUTES OF EVIDENCE.

George Foggo, Esq., Historical Painter, examined:

I have been repeatedly employed to design for the application of my art to bronze and silver. That manufacture now in England is exceeding depressed; principally, I should suppose, in consequence of the want of copyrigh, on which account the French have very greatly surpassed us — In England at the present moment the uncertainty of recovering in cases of piracy, and the great expense attending a lawsuit, make it almost impossible for any but men of great capital to undertake such works at all. When they are undertaken, as the sale is exceedingly limited, those articles are almost universally converted into silver. In France, in consequence of the cheaper law and the greater facility of recovery, a much greater proportion of works of that nature

are cast in bronze. So doubtful is the recovery, and so great the expense attending it, that where otherwise 50 guineas would be expended on a design, not more than 5*l.* would now be ventured by the silversmith. As, for instance, in one case where the amount to be expended on a piece of plate was 800*l.* I received 8 guineas for the design. In other cases, where the finished work would amount to 200 or 300 guineas, the utmost the silversmith could spend upon the design has been less than 5*l.* If the copyright could enable the undertaker of such works to spread them to the amount of 20 or 30, he could then afford tbn times more on the design, employing none but the best artists, and rewarding them liberally. The main advantage of the copyright in France depends on the circumstance of the cheap law. I was lately in court in a case where the sale of spurious works was most clearly proved. The expenses, I was informed amounted to 100*l.*, and the award for the sale of five different and distinct prints was 15*l.* From what I recollect of such cases in Paris, I should say that the expense would have been under 15*l.*, and the award might have been 100*l.* It is, therefore, in France worth while (particularly when we consider the certainty of recovery) for a man of talent to claim his protection; it would not be so in London. Bronze and silver are the same kind of manufacture, I should say: in most instances, bronze is first cast for the sake of the silver plate; that was the case with the celebrated Achilles' shield, by Flaxman. The original shield in bronze, most elaborately and beautifully finished, could not have been sold for much less, if any thing less, than the silver-gilt. But the taste is so much in favor of the more costly metal, that no one would give 3,000 guineas for the bronze, when they could get the silver-gilt for 4,000 guineas, although the value of the silver be not above 250*l.*; and I should say decidedly the bronze was most valuable; and I apprehend the taste of the public in that respect is deficient, inasmuch as gold and silver, having what I should term a positive color, are less applicable to the works of art than bronze, and still more particularly marble. In bronze it is more a work of casting. In fine works it is afterwards wrought up with great nicesty by the chisseller; in the above case Mr. Pitts, a very celebrated artist, was employed for that purpose. With respect to the mode of protecting inventions and designs in bronze, I think it, if it were worth the while of a man of talent to claim his protection, it would be fast carried out, according to our habits, by special juries, but under the present system this is much too expensive. By special jury, I mean a board of persons conversant with art, but subject, like our juries, to a challenge. Something like a *cour de prud' hommes*, or a board of competent arbitration, but doubt whether it would be right for them all to be artists. I also think that the period of the duration of copyright should be in proportion to the talent displayed, and the importance of the object. Some cases might not deserve three months protection, others would require 50 years. Some things deserve also to be better protected than others, in consequence of the great facility of copying them. All works that can be cast in plaster particularly require protection; for that which has cost the labor of months or years, and vast expense, may be re-produced by the plagiarist in a few hours. Such circumstances prevent the application of first-rate talent to any such productions. In a great measure the protection should depend on the talent of the artist. I consider that it would be for the interest of the public, for instance in a very beautiful work, that such a board or special jury should have the power of proposing, on the part of the public, to the artist, that his design should be bought up; but I have a very strong objection to the consideration of the interest of the public being paramount.—The circumstance of the Americans giving to their citizens an exclusive privilege of copyright, takes away all energy and exertion of those citizens. It has become scarcely worth while for an American to produce a work of talent, when the bookseller can get them from abroad for the price of a single copy. The French are superior to us in the accuracy of the execution of their work, but not equal in fancy and imagination; I have myself been employed to design for a work that has been sent over to France to be executed, and the execution was exceedingly correct. I should speak rather in favor of their execution and knowledge than their taste; for works in metal we still prefer that of the early period of Louis XIV. as more free and effective. I attribute the superiority of the French in

correctness of drawing to the various schools of design established in every principal town, but more particularly in Paris; there schools are so various, that I do not think that any but a resident in Paris can fully understand the relative difference; they consist of the Royal Academy and the Government school of drawing; of private schools under an eminent artist, and of subscription academies, with no other than mutual instruction. Having resided seventeen years in that capital, and studied in one of their best schools, and at the Royal Academy, for eight or nine years, I am decidedly of opinion that private schools, under the most eminent masters, are greatly superior to any public establishments. The private schools are the original system of the instruction in France, as they were in Italy during its greatness. These schools are generally intended for the higher branches of art; but persons who do not evince talent of a high order, naturally fall into the employment of manufacturers. There is one school in Paris for the instruction of artisans employed by manufacturers. Each department has also something like a school of that kind; I am afraid it will be found they produce very little of that which may really be called talent. The national course of instruction for artists in France is very superior to the usual means in England; it consists of private schools, which system bears the most national character of any.—Every man of talent, as an artist in France, is supposed to owe much of his reputation to the pupils he produces; his object is to produce men of superior abilities, but the school gets popular, and the system is so well understood, that the number of students becomes very great, and from their superiority they are, when interest does not interfere, appointed teachers in the Government schools, and give a general tone to the talent of the country as far as circumstances admit. The Government schools are very inferior to the others in utility. The private establishments have the spirit of the country in them much more than the Government schools, for the Government schools are founded on one system, and, with one or two exceptions, all follow the same course; they do not fall into the wants of the times and the people so much as the private establishments. I do not mean that they are in name national schools, but they are the schools that give a national character to the French artists; which character is materially checked by the control of Government administration. In France, Government interference in positive instruction is injurious. The encouragement given to art in France is principally from the liberality of exhibitions, and most particularly of the libraries and the museums. The opportunities of study in the libraries and museums are far superior to any thing in this country. I may mention, in proof thereof, that the works of Flaxman, of Mr. Hope, and the publications on Etruscan vases of Sir William Hamilton, were shut up in private collections in England, and produced little effect on the public taste; but being placed in the libraries in Paris and other towns, where not only artists, but the public, had free access, the knowledge and taste of Flaxman and Hope became there generally appreciated, instead of being, as in England, confined to a few. A fine example of their museums was that of the French monuments, where, in appropriate halls, samples of French statuary of seven successive centuries, afforded an excellent opportunity of studying the taste and the history of the nation. That of mechanical machines is also of great utility. Museums, I apprehend, must be the permanent and all-important sources of taste. Public lectures on the great principles of design and taste may be advantageously added thereto; and from the necessity of the case, another country being so greatly in advance of us in those branches, schools for the instruction of mere outline, and still more of the rules of perspective, would produce very great and beneficial effect. I certainly do think that much advantage would be derived from instruction in the proper simple rules, without shackling the taste; but it appears to me that good taste is so essential to the interests of the community, that museums should be provided at the national expense; but practical skill being an advantage of a more individual nature, ought rather to be paid for (moderately) by the individual. The general taste is decidedly higher in France than in England; but superior taste and imagination more frequent in England. I account for the distinction from this circumstance: I think the arrangements of Louis XIV. and Colbert have placed such fetters on imagination, that the utmost that instruction

can do in France is to inculcate fixed principles and precision of execution. In the fourth year of the republic, under the Convention, schools of various kinds were instituted. Exhibitions and prizes were also decreed on a liberal scale, but they were ultimately counteracted by the re-establishment of the Academy, similar to Louis XIV., and the occasional injudicious interference of the Emperor. There has been no alteration in the Academy of Arts from 1800 till the present moment, except the exclusion of foreigners from the prizes, and a few minor bye-laws. I conceive that the fixed principles and correctness of execution are all that can be properly conveyed of instruction to an artist. They are all that can be wished for when competition is encouraged; and without free competition art is stifled, therefore it is absolutely essential. With regard to the departmental schools, if the appointments of professors were popular they might do a deal of good; but when I have seen an old man of 62 or 63 appointed to one of those schools, not for the good of his pupils, but to save him from starving, I cannot expect much good therefrom; when I have known, in the principal school for the mechanics of Paris, a man of the highest talent, M. Peyron, after 25 or 30 years' exertions in the under professorship, superseded in his claim to the higher professorship by a friend of the Minister, I find a total want of that principle which free competition and proper elections would have carried out. The reason I think superior taste and imagination more in England, is on account of the restriction in France, where, being under the Minister of the Interior, all follow one system and routine. In England, competition is created by commerce, which frequently brings a man from the humbler branches of manufacture to the highest stage of art, such as Martin, Muss, Bone, Bacon, and Banks. In fact, the French attempt to teach that which is probably not within the strict limits of teaching, and interfere a great deal too much. The positive, the undeniable, fixed, and positive rules of art, such, for instance, as perspective, anatomy, proportion, and perhaps botany, and those things which connect arts with manufactures, in which the principles are undeniable, should, of course, be taught. I think it almost as necessary for a people to possess a knowledge of those points, as to know how to write; I consider it a second way of reading all the beauties and merits of nature. The deficiencies, both in England and France, which still exist, are, first, the deficiency of correctness of perspective, even where correctness of outline is otherwise generally attained; perspective is often little understood in other countries, but is particularly neglected in England. Secondly, a very imperfect knowledge of the history of the arts and of commerce, their effects on each other, and on the state of nations, and thence false theories. The relative influence of the taste of Paris and London is this: the taste of Paris spreads all over France almost like lightning, while that of London is very much counteracted by the different habits and influences of our commercial towns: for this very reason, museums exactly similar might be established in France without any material injury; but museums in England would be best under the direction of a general board, but modified by the management of men capable of applying them to local purposes. If the town of Liverpool had a museum, it certainly would not, if left to the management of a local board, be similar to a museum in Birmingham or Sheffield, and it would be right that they should not be similar. A knowledge of mineralogy might be exceedingly useful in one town, and perfectly useless in another. Objects of general utility, of general taste, such as fine representations of the most beautiful pieces of sculpture, objects of taste, such as vases and ornamental designs in general, might be exceedingly useful in them all, but each would superadd what was of local interest in proportion to its connexion with different countries, and the manufactures on which it depended.—A local administration should be under a general control, or the control of a general board, in order to prevent local interests from holding too great an influence in the elections, and contracted views in the management; for I am greatly mistaken if, under a well controlled representative system, the arts are not capable of disseminating knowledge in fifty ways that have never yet been attempted, and I am also strongly impressed with the notion that they should tend to a general improvement of the morals of the people as well as of their intellect. I have no doubt that, under a proper gene-

ral board with local management, they would be highly capable of both. Some of our manufactures far excel others in the merit of the designs, and this is usually in proportion to the difficulty of copying them, as the injury of a deficient copyright is therein less felt. I should instance, particularly, the japan manufacture, where the designs are more exquisite than any thing produced abroad. The excellence of a design is partly to be attributed to the difficulty of copying, inasmuch as it is an impediment to the plagiarist, and consequently a protection to the original designer. In the case of the japan manufacture, in consequence of the difficulty of the manual operation itself, the thing is better protected, and I ascribe it partly to the system of encouragement and competition established in the manufactures themselves; the works in japan are, however, conspicuously defective in perspe tive. I mention this to show, that of all the branches that ought to be taught, that of perspective is one of the first, inasmuch as it is not readily to be obtained. Each manufacturer in the japan trade has his own designers and painters. Designing is not a trade by itself, by which persons get their livelihood, that is, to furnish patterns to the manufacturers of designs in paint, not at least in Birmingham; what there may be in London I am not acquainted with. In that particular line the designs are very superior, but there are inaccuracies from want of instruction. At some interval of time and distance I examined the French and English japan works repeatedly, but not lately; there are no French ones that can at all compare with ours. The French shun the competition, though many individuals in France are anxious to introduce our japan articles in France at present. We have the advantage in both material and design; we are not equal in execution to the Asiatics, but superior in design. Mechanics' Institutions would be so far more beneficial than any school of design, that they would convey to pupils knowledge in chemistry or mechanics or design, according to their natural genius. They would do exceedingly well if you could manage the election of the professors; but in that case a member of an Instituiton is more likely to be elected than one not a member; it is therefore local talent which gets the influence, which is not so good as a person confirmed by the approbation of a general board. If the Institutions would agree to be subjected to the decision of a board in London, that much good might be effected. The advantage Mechanics' Institutions would derive from the parent Institution is, they would collect a variety of models, which they cannot now obtain.—Therefore, in this country, where you have three or four branches of trade carried on, in Manchester, and in some places almost every branch of trade, you would not confine it to a school of design only, but make it one branch of what would be a drawing class; those who have a taste for chemistry would be good preparers for the materials of printing, and so you would make it useful.—Another way might also be easily accomplished, by placing museums under the direction of men capable of communicating instruction.

Samuel Wiley examined:

I belong to the firm of Jennings and Batteridge, of Birmingham, by whom there have been great improvements made in the japan trade of late years; being men of taste, and stimulating their apprentices and teaching them the art of drawing; they have taken great pains. Our men have inserted works of art in the Birmingham Exhibition, and other places. Our trade might be increased by improving the public taste; the public taste is bad; I could sell them the worst things, the mot unmeaning, in preference to the most splendid designs and the best executions. I could frequently sell bad articles, bad in execution and design, for the same money as I could sell the best. The Chinese adhere to but one style of work exclusively, and that most beautiful in point of execution, but unmeaning as it regards design and perspective; in fact, the designs are very bad. The materials they use I consider one great means of their goods looking so much better than ours; the material they use. Their material after it is laid on, whether it is gold or gold powder, is never varnished, and there is a degree of brilliancy and richness that never appears after it is varnished; we are obliged to varnish ours to preserve its colors, in doing which we lose a great part of its brilliancy. Some years ago we procured gold powder from China, and could make it appear of the same appearance as

that from Canton, and we found it very valuable indeed for the purpose of imitating the Indian cabinets, and the various articles we have to copy or to repair; but there is a different appearance, as different as possibly can be, between the Indian gold and gold powder, and that of British manufacture; and the material they use for laying on the gold is different; we are informed it is a gum extracted from trees, and when the parts are laid on they are the very same as though you cut small gold wires and laid them in, there is that prominence. There is no trade in this gold powder; we only got it from one person. Accidentally we met with a party who had been an Indian merchant; we found it much cheaper than ours; Mr. Jennings was about making a journey to Canton to procure some himself. I believe the Chinese prohibit the exportation of it from China. I do not know whether the importation is prohibited here; we have applied to various merchants for it; whether it is an article that never comes under their observation we do not know. We have not had it analysed; I think it is prepared by a chemical process, and I think also that it is from the compound that it is better; very likely the metal with which they mix their gold is of a finer quality than ours. The Chinese have a great advantage in their gums. We pay the workmen from 15*s.* to two guineas; in some few exceptions we pay from three to four guineas and a half; one we pay four guineas and a half —the only one; every workman designs his own pattern. A good designer is well encouraged; he is the most valuable man. The French prefer our articles, because they are much better in material, workmanship, and design, in characters, beauty, and every thing. They do not seem to raise the japan trade to an art; they appear merely to daub it over, and call it japan; there is neither design nor beauty of execution in French work. It is indispensably necessary for a person who designs to be acquainted with the manufacturing branch of the business. Our workmen generally come at twelve or fourteen years of age; if they have previously been taught drawing with perspective, it is a sort of tuition in the other branches; drawing and perspective are essential for them to be taught this afterwards. We teach them first of all drawing and designing, and then manufacturing. The first branch may be learned in London, or elsewhere, and the rest in Birmingham.

M. Claude Guillotte examined:

I am a maker of jacquard looms, and of all sorts of looms for silk manufacture, and of French bar-looms, by Premaillerre, upon which (the bar looms) from ten to thirty ribbons at a time may be manufactured, and the whole of the machinery conducted by a young man. Of those, I manufactured 150, at several times, and for several parties; and they were the very first ever introduced to this country, and for which machinery I took out a patent. Jacquard machinery adapts itself to all sorts of tissue. I made three years ago, the most complicated machines ever produced in England, with 4,600 threads, at a cost of 50*l.*, and before it was put in order and set to use, it cost 100*l.*; it was for weaving napkins and table-cloths, which was all worked by one man. I also made many of the jacquard machines, with 1,600 to 1,700 threads, for smaller table linen. Of late, I am making jacquard machines, by hundreds, for all parts of England, where they had not been introduced before. For Yorkshire, I am particularly engaged at present, making them for merinos and damasks, and the same for Bolton and Manchester; I have agents in Manchester, and Bolton district; and I have been engaged in making them at Coventry for ribbon. There are from 7,000 to 8,000 jacquard looms in operation in the country, and there has been an extraordinary increase in the demand for the silk manufacture, I received in London orders for six, eight, and ten at a time; in Yorkshire, I receive orders for from sixty to eighty at a time; and for worsted manufactures, the demand is also considerable. The demand commenced about eleven years ago, and has become much more active of late in Yorkshire: and yet, I was four years ago in Yorkshire, at Halifax, Huddersfield, and the surrounding country, with an interpreter, taking with me half a dozen, and there was no individual willing to purchase one; and after my return, I received an order for one machine, in order to make an experiment; it succeeded, and the consequence was, an order from the same individual, a Mr. Gill, to manufacture more than a hundred such machines, and there was a demand at any price from every body. These were to re-

place the old mechanism, which was employed in producing small patterns; those are principally used for waistcoats. The demand could not of course continue so great as it was; but there is still a demand, principally for merinos and damasks. In Scotland I have an agent, but I do not do much, the price of the cards for the manufacture of Scotch shawls being too high. The difficulty of applying these cards to shawl-making is, that for the production of the beautiful pattern, 5,000 or 6,000 are required, which makes it too expensive a machinery. At Norwich, a good many were sold one or two years ago, but they are expensive, and it has prevented its being much applied to the silk manufacture. In Scotland, they use a draw-boy instead of a jacquard to make the figure, to draw the threads that produce the figure on the cloth: in Scotland and Norwich, the number of cards which are necessary for the production of a figure, make the employment of jacquard machines much more expensive. Sometimes I employ foreign workmen in the manufacture of my machines, but they leave me when they can better their condition; and a good workman, such as I can employ, will get thirty shillings a week. I think the price is cheaper here than it is in France, and I acconnt for it thus: because I carry on the whole of the manufacture in my own workshops; while in France the production of a jacquard machine is divided among the workshops of several persons. There are only two principal makers here, but the competition between those two is so great that the prices are kept low. Many inexperienced persons have made attempts to make the machines, but have not been able to compete with those who had more experience, and they have failed in producing the article as cheaply as we. I employ about from thirty-eight to forty workmen, all in London. The operation ot adapting the design to the loom is this:—First, the design or pattern to be made on the cloth is drawn on paper, and produced for approbation; it exhibits on paper what it is intended to be on the cloth; as the threads are very minute they are then as it were extended on another paper, the rule-paper, of a larger size, which shows the pattern as it were magnified, so as to place so many threads to the inch, perhaps twenty, so that every square represents a thread. This is what the French call *mise en carte*, and in English, put upon rule-paper. The next process the rule-paper undergoes is, to be read in, which transfers the pattern from the rule-paper, and prepares it fully for the stamping of the cards. The rest of the process is mechanical, consisting of punching holes in the cards, according to the number required, and applying the card to the machine. In this mechanical operation I have seen 200 boys employed in weaving the richest figures in the loom. To so simple a principle is the process of weaving now reduced, that even boys of sixteen are set to weave the figures of so complicated a nature, as formerly would have required men of twenty or thirty years' experience. In some departments of this process, the manufacture is superior in England; in others in France. Plain silks, if manufactured with the same materials, the production will be equal in England as in France; figured silks are equal, as respects the mere manufacture; and there are two points of inferiority, the designing and the *mise en carte*—put in rule-paper. One particular reason for inferiority in England, which has much struck me, is, the very costly price of cards. In the woollen manufacture, the cards which have been used for woollen goods have, as I have observed, been returned to the Excise. A return of duty has been obtained. I think that, if the same thing were done with the jacquard cards, it would have a tendency to diminish the price. Though generally speaking the price is about equal in the two countries; yet in the reading the designs there is this enormous difference; the average price in France is three francs, or half a crown sterling; in England, the price was a long time 15*s.*; it came down to 10*s.*, and I now charge 8*s.* per hundred. I attribute that to two causes, the presence of silk manufacturers, which has created a greater competition, and a greater necessity for activity. This activity commenced in 1823, but since 1826 the activity and competition were very greatly increased. The consequence of this competition has been also the introduction of a great many French dyers to settle here. The French designer understands the *mise en carte* (putting on rule-paper) better than the English designer; and the French *metteur en carte*, understands design better than the English

metteur en carte. The great reason that occasions this great difference between the *metteurs en cartes* and designers of England and France, is, that the designers themselves are obliged to put it on the rule-paper, and previous to that, go through every branch of the business, (including the weaving,) and this is undoubtedly the cause that they are more perfect. I do not mean to say that they design better in France than here; but there is a much greater number of designers of the same capabilities in France than here. In consequence of the encouragement the French designers receive, they are as well more numerous as more talented in their science, in common; although there are individuals in England equally as clever, and with a profound knowledge of their art. The artist who draws the designs at Lyons, is the artist generally employed to transfer it to the lined paper. This person, whom I consider the *metteur en carte*, is only employed in that; he is inferior here. In Lyons, in a great number of instances, there is never a design drawn at all; but the first production of the design is on the lined paper. The *metteur en carte* is himself an artist. It is in the connexion between the arts and the manufactures that we are inferior. In France a manufacturer employs from three to four artists, and in England one artist supplies eight to ten manufacturers. An indifferent artist employed in painting the patterns on the ruled paper may be obtained for 50*l*. a-year, but there are men whose services are worth from 400*l*. a-year, or even a share of the manufacture. The sale of the fancy trade entirely depends upon the taste and abilities of the designer. In France there are often only one or two artists who are paid, and largely paid, who get from 180*l*. to 200*l*. a-year, but there are several who give their services for the instruction they receive. The *metteur en carte* ought to be well instructed in designing. He ought to be also well acquainted with manufactures in theory and in principle. They are so at Lyons, but they are not so in this country. The jacquard loom was first adopted at Lyons after the Revolution. Before the invention of the jacquard machine, eight or ten years were required to make a good workman; afterwards six months were sufficient. For ten years after the discovery, the machinery remained with very little influence, but designers increased with the introduction of the machine. From 1808 to 1810, the machine was brought into activity, but at that period it was very imperfect. In 1814 it was much improved, and in 1815 it was fairly established. When France possessed the monopoly of the jacquard machine, it gave her great advantage in other countries; but since it has been introduced into many other countries, France has only by great exertions produced better and cheaper than they. There is a school of design at Lyons. The young artists have, since the discovery of the jacquard particularly, turned their attention to the *mise en carte*. There has been every augmentation of such young artists; indeed, there were no such artists before; for it was found requisite to set up jacquard machines in the school of design. This lasted two or three years only, as they now obtain the required knowledge of the loom out of the school. The discovery of the jacquard loom infinitely multiplied the number of young artists, who devoted themselves to the *mise en carte*. The great advantage of jacquard machinery is this, that it enables that to be done in a few weeks, which before occupied months; and that the change of a pattern formerly was a long, laborious, and costly affair, and now it is a very simple one, and may be done in a few minutes after the completion of the reading and the stamping of the cards. In France, in ordinary cases, our artists receive six months' instruction in the theory of the manufacture, before they are called into the field of practice, after they have been instructed in the school of design at Lyons; or artists, during their instruction, must pass two hours a day to understand the theory of the application of the design relative to the machine. There are private instructors who give those lessons in the school of design at Lyons; they also give instructions in the *mise en carte*, making their talent practical. The English copy the good French, and the French copy the good English. The best English designs are those in cotton goods; but the English do not understand the *mise en carte*. We sometimes make good copies from English patterns for the Spitalfield looms from the English printed muslins, but it requires taste and knowledge to arrange them. The

French manufacturer can come with patterns every year to England, bringing with him patterns on the material; not only designs on paper, but on the material; whilst the English manufacturer only brings it on the paper; the cause of that is, the French manufacturer employs weavers who are solely engaged in the production of patterns, and as the pattern on the tissue cloth shows more distinctly the effect than the drawing on paper, it gives them an advantage in the market. There are individuals who are engaged, and who collect at Paris the patterns in vogue there, which they bring and dispose of in England, and they also carry to the continent such patterns as they can collect here for the purpose of sale. These only serve as mere ideas; in the execution of the working drawings the French improve upon us. If there were a school of design established in London, its effects in three years would be so to equalize the manufactures of the two countries, so that the country in which they were produced would not be recognisable. Jacquard machinery is applicable to every fabric figured or flowered, every thing that can be woven; to every species of tissue to which a loom can be applied, even to straw hats, horse-hair and wire, and every other species of web. The principal difficulties in the way of improvement in the silk manufacture are, first, the high duty on paper. The high price of paper has this injurious effect, that the manufacturer is very unwilling to chenge his patterns. There is a difference between the cost in France and England; it is as one to four. The English card is superior to the French; but that makes little difference, because it is never worn out, a new pattern being always introduced before the cards are worn. The two disadvantages I consider are these, the higher price of the cards, and the inferiority of the *metteur en carte*. With respect to colors, I think, in a great many cases, where there is an apparently greater beauty in the French dyes, they are much less permanent than those of England, and I have seen many examples where, after a few weeks' wearing, the French colors have wholly faded.

"I take the liberty of making the following few remarks about designing and *mise en carte*; for as this is the very head part of all that belongs to the weaving department, and, at the same time, is the very least cultivated in this country, it is before any thing else the most worthy of your attention and consideration. For as long as this part of the manufactory is not highly improved, and proper schools for design and *mise en carte* erected, and children, who alreadyhave acquired the practical and theoretical part of weaving, are engaged and trained up in this art, France will always have to boast over England of the honor of sending more fancy patterns, and finer and more beautiful workmanship, and, in fact, brought to the highest perfection. But, on the contrary, if it should meet with your Honorable Committee's approbation, and get the least encouragement to bring it into fulfilment, and to get such schools erected in some quarter of Spitalfields, or its arrondtssement, there is no doubt whatever in a very short time the English manufactures will soon rival, if not altogether equal, the French manufacture, and thus throw off the shame of seeing foreign manufactures surpass the English in quality and superior workmanship.

"Your very humble servant,

CLAUDE GUILLOTTE."

Mr. John Henning. examined:

Have you been in the habit of executing works in relief for a considerable time?—Yes.

You executed the frieze on the corner over the gate-way at Hyde Park Corner, and the frieze on the Atheaæum?—Yes, in conjunction with my son John, who had contracted with Mr. Burton to do that work in 1827, which was followed by the frieze of the Athenæum, which was a selection from the sculptures of the Parthenon. On both friezes the design was drawn upon the stone, and cut without the usual process of pointing. These were our fist works of the kind in stone.—Previously I had been engaged principally in drawing and modelling, and our first work in intaglio was the sculptures of the Parthenon, which was begun in 1816, and finished in 1822.

Have you ever had occasion to consider the subject of a copyright?—Yes, I have; but I have only to tell the Committee of the difficulties which we modellers and sculptors experience; I do not feel that I dare presume to propose a rem-

edy, though I may notice the evils which I have suffered.

State them as clearly as you can.—I have brought a specimen of the frieze of the Parthenon engraved on slate in intaglio; I have also brought a cast of this intaglio in plaster, and another, broken, in the way in which it appears now in the Museum; the intaglio is the matrix from which these casts have been taken; previous to engraving the intaglios, careful drawings were made from the mutilated marble, and the deficiencies were made good to see the effect, and then they were transferred to the slate in the opposite direction, that they might be right when cast.

You were going to state the difficulties which these specimens were to elucidate? —Yes, as soon as the casts are issued, whoever lays their hands on them may, with very little trouble, take moulds in sulphur, wax, or plaster, and multiply them to any number.

You consider that the law does not afford you protection?—There is no protection, as I understand, but in an action at law. The thing appeared so unmerciful to me, to lay hold of a poor man to raise an action against him, that I never could think of doing that. It struck me that if there was any thing like a committee of art in London that could be appealed to, to identify where a spoliation or theft of this kind had taken place, it might be much cheaper than law.

A species of arbitration committee?—Yes; for any gentleman who knew any thing about it, could detect those thefts readily.

Have you ever thought of the subject of registering such works?—I always have understood by the law, that if you put your name and date it was sufficient, but I think such property as much my own as my clothing, and no one has any more right to appropriate it than to claim my personal labor without remuneration. The originals exist in the museum, open to all who may desire to make studies from them, without condition, but compliance with the economical arrangement of that institution. This would be fair and honorable strife who could do best; but what hand or heart can contend with the covetous and unjust, who, by the cunning labor of a few days can contrive to rob me of years of life, and scatter over the whole land the deteriorated casts of my works, much to my prejudice as an artist?

All you want is a cheap tribunal?—That is the very thing wanted.

Have you suffered from your own works being infringed upon?—Yes, very much, indeed.

Can you give any remarkable instance? —I had, within the last six months; a man without giving me his address, wrote to me twice, and put me to the trouble of writing to him; at last I got a third letter, giving particular orders to make them ready. I took it to be some gentleman; at last I found after I had packed them up by a given day, I found that he had gone to a person who was in the habit of furnishing people with them, and he never came near me. Nothing would do in that case but an action at law, therefore I preferred rather putting up with the loss.

You submitted silently to the inconvenience rather than encounter another?—I cannot blame any body for that but myself.

Then he pirated your works in this case? —No, I could not call this piracy, but rather resetting, for he went to the pirate who served him with my stolen goods; but many have pirated them, and continue to do so.

You felt you could only have recourse to an action at law?—I never understood that I had any other recourse than that.

Why had you not?—Because of the expense, and I could not think in my heart of prosecuting a person probably without a shirt, who perhaps did it from poverty; I could not proceed against him.

You are a self-taught artist?—I do not know what to answer to this question; however, I have not had any thing like what might be called regular instruction in art. In art, as in every profession, the master, in many cases, can only be considered as the finger-post which points the road the pupil must go on to the place; the pilgrim, creeping or running, must exert himself to the end of his journey, otherwise he will never arrive there.

(To be continued.)

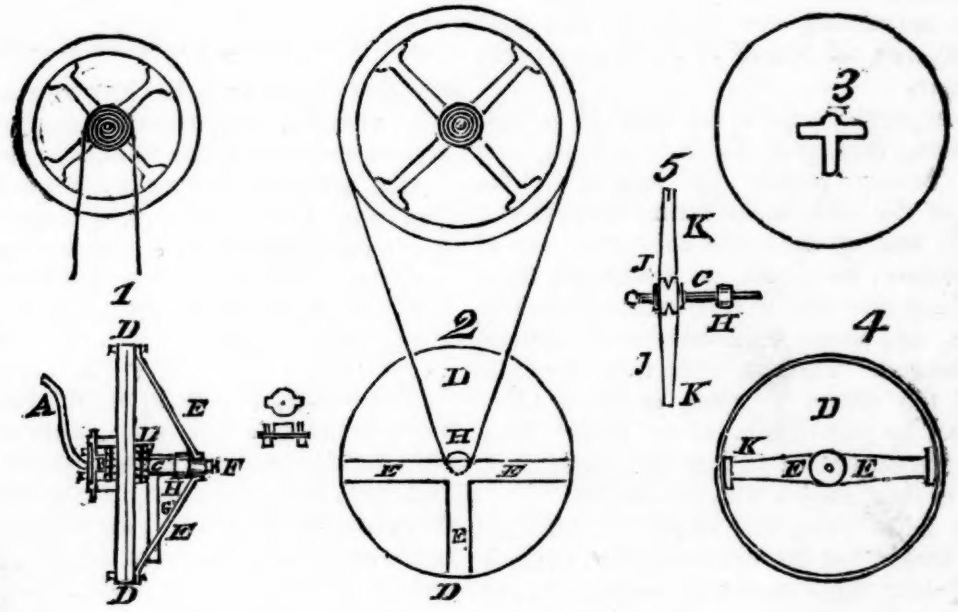
We have frequently called attention to Avery's Rotary Engine. The following specification, from the Journal of the Frank-

lin Institute, will place the subject fairly before the public.

From the Journal of the Franklin Institute.

FOSTER'S AND AVERY'S ROTARY STEAM ENGINE.

We made some remarks on the subject of this engine, in the last number, and as it has attracted considerable attention, we have determined to publish the specification entire, in order that the nature and amount of the part claimed may be fully understood. This, with some further remarks upon it, was crowded out of the last number of the Journal, and, upon reflection, we have determined to omit the said remarks, and to give the specification alone. The original notice of this engine may be found at page 171, vol. ix.—[Editor J. F. I.]



SPECIFICATION OF A PATENT FOR AN IMPROVEMENT IN THE REACTING STEAM ENGINE. GRANTED TO AMBROSE FOSTER, BRUTUS, CAYUGA COUNTY, AND WILLIAM AVERY, SALINA, ONONDAGA COUNTY, NEW-YORK, SEPTEMBER 28TH, 1831.

To all whom it may concern, be it known, that we, Ambrose Foster, of Brutus, Cayuga county, and William Avery, of Salina, Onondaga county, in the State of New-York, have invented a certain improvement in the steam engine, commonly called the reacting engine, and that the following is a full and exact description of our said improvement.

Fig. 1, in the accompanying drawing, represents a side view of the engine, the revolving arms not being visible, in consequence of their being enclosed in a circular case, to be presently described. A is a steam tube, connected with a boiler, and forming a steam-tight joint, in the box B, where it opens into the shaft C, which is made hollow to the requisite depth. D is the edge, or periphery, of a case, or drum, wlthin which the arms from which the steam is to issue, revolve. E, E, are braces, which may be attached to the case, or drum, and at their junction support a socket, containing a centre pin, or screw, F, against which the shaft C is to run. G is a tube, through which the steam passing into the case from the revolving arms, is allowed to escape ; a portion of this steam is employed to heat the water by which the boiler is to be supplied. H is a whirl upon the shaft C, a strap from which may be employed to drive machinery. Where the same parts occur in the other figures in the drawing, they are represented by the same letters.

Fig. 2, shows the flat side of the drum, or case ; the arms, or braces, E, E ; the

whirl H, and the manner in which straps, or other gearing, may be carried from one wheel to another. Fig. 3, is the opposite side of the drum, or case.

E, E, in Fig. 4, shows the flat sides of the revolving hollow arms; and J, J, Fig. 5, is an edge view of the same. In Fig. 4, one side of the case is supposed to be removed, and, in Fig. 5, the whole case. At K, K, openings are made in the narrow edges of the arms, in directions opposite to each other, to allow of the escape of the steam introduced into them through the shaft C, with the hollow of which they communicate.

In an engine which we have in actual operation, the arms, E, E, (or J, J,) are each twenty inches in length. The width of the arms at the centre is about six inches, and at the ends about two and a half inches; in depth, or thickness, they are about one and a half inches, near the centre, and about three-fourths of an inch near the end. The size of the holes through which the steam escapes, is about one-quarter, by one-eighth, of an inch. The holes are so perforated that the steam shall issue at right angles with the shaft.

We have found this engine to act with great power, but do not intend to confine ourselves to these particular proportions, as we mean not only to vary the size of our engines, but also the relative proportions of their respective parts, according to circumstances.

L, L, are parts of stuffing boxes, employed to prevent the eseape of steam, in a manner well known to machinists.

We find it to be a point of great importance to give such a form to the revolving arms, as shall subject them to the least possible resistance from the air; we, therefore, instead of making them in the form of round tubes, which has been heretofore done, give to them the form which results from making each half of the arm a segment of a large circle, so that, when the two halves are united, the edges of the tube present acute angles. The tubes, however, may be made elliptical, or oval, and the same end will be, in a great measure, attained. We use any number of such arms on the same shaft, as we may find best adapted to our purpose.

We do not claim to be the inventors of the reacting steam engine, nor of the case, or drum, within which we intend the arms shall, in general, revolve; but what we claim as our invention, is, simply, the giving the oblate, or flat, form to the revolving arms, so that, in proportion to their capacity, they shall experience much less resistance from the air than that to which they have been heretofore subjected, thereby obtaining a greatly increased power.

AMBROSE FOSTER,
WILLIAM AVERY.

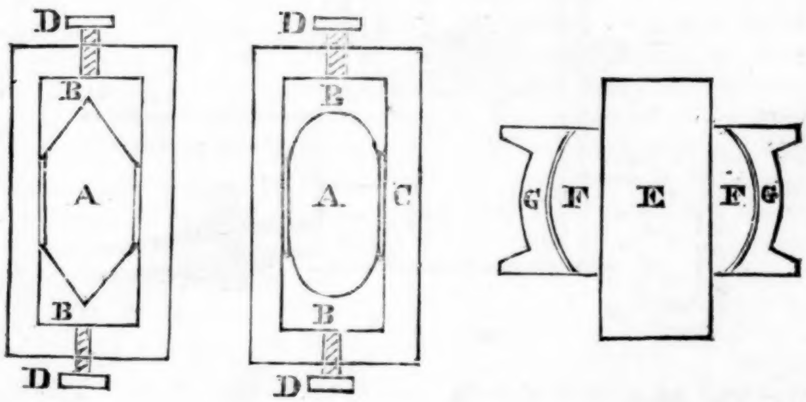
From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR A MODE OF FITTING THE BOXES FOR GUDGEONS INTO THE PLUMMER BLOCKS; AND ALSO THE FITTING OF THE BEARING OF THE SLIDES FOR LOCOMOTIVE AND OTHER STEAM ENGINES, AND FOR OTHER PURPOSES. GRANTED TO MATTHIAS W BALDWIN, CITY OF PHILADELPHIA, AUGUST 17, 1835.

The boxes in which the gudgeons used about locomotive and other steam engines, and machinery of various kinds, are received and turn, have heretofore been fitted into the plummer blocks, or pedestals, made to receive them, by filing, or other analogous means, their ends being made either square or angular, and adapted to corresponding parts in the plummer block, or pedestal, prepared to receive them. My improved mode of fitting them consists in turning or boring the opening, or seat in the plummer block, into which the boxes are to be fitted, so as to make each of the cheeks cylindrical segments. The boxes in which the gudgeon is to run, are then to be attached to each other by screws, or otherwise, and turned by means of a slide rest, or worked in any other manner, so as to make their ends cylindrical, and to cause them to fit exactly to the cylindrical cheeks, prepared for their reception, in the plummer block.

In constructing the slides for the pistons of locomotive and other steam engines, and for other purposes, the slide bar has usually been made square, or four sided, and its angles usually right angles; and the brasses, or bearings, contained in the box within which it slides, have been adjusted to it by set screws operating upon three sides thereof. In my improved mode of construction, the adjustment is made to operate upon two

sides, or edges, only. For this purpose, I make my slide bar flat on two sides, and the other two sides, or edges, half round, or otherwise form them into two planes, meeting each other along the middle thereof, by which means the rod will become six sided, this latter form being preferred to the rounding of the edges. The box within which the bar slides, is provided with two brasses, or bearing pieces, with hollows, or grooves, in them, adapted to the edges of the sliding bar, and fitting accurately between the parallel sides of the box; when, therefore, the brasses, or bearings, are adjusted to the edges of the rod by set screws acting against them, the rod is embraced by them so as effectually to check all tendency to a lateral motion, as will appear by an inspection of the drawings deposited in the Patent Office.



Figs. 1 and 2, cross sections of the box and slide bar, with angular and with circular fittings.

A, slide bar.

B, brasses, or bearings.

C, boxes.

D, adjusting screws.

Fig. 3, horizontal section of a plummer block and boxes, through the centre of the gudgeons.

E, gudgeon.

F, box.

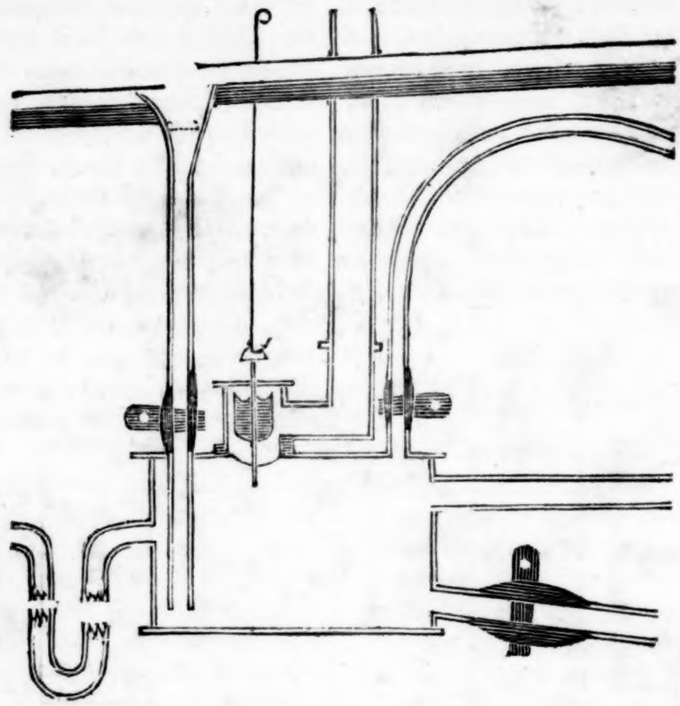
G, cheeks of the plummer block.

What I claim as my invention, and wish to secure by letters patent, is the mode of fitting the boxes of gudgeons into plummer blocks, pedestals, or other receptacles, by boring, turning, or otherwise, so as to make the fittings cylindrical. I also claim the fitting of the slides for the pistons of locomotive engines, for other purposes, into brasses, or boxes, adjusted and operating in the manner hereinbefore set forth.

MATTHIAS W. BALDWIN.

METHOD OF EMPLOYING THE ESCAPE STEAM OF A STEAM-ENGINE FOR DISTILLING AND OTHER PURPOSES. INVENTED AND PATENTED BY CAPTAIN DAVIS EMBREE, OF NEW RICHMOND, OHIO.

The cut is intended to represent the heater (or, as it is sometimes called, condenser,) of a steam-engine. This is laid down 45 inches in diameter, and 30 inches high. It matters not what shape it has, but its contents ought to be greater than the contents of the cylinder; three or four times as large would be no disadvantage: part of an old steamboat boiler would make a good one. At the top is an opening of 5 inches diamter—over this there is a cast-iron pipe 8 inches diameter in the clear, and 12 inches high: a valve seat at the bottom with 4¾ inches opening, and a guide for the stem of the valve of the same casting. At the top of the pipe there is a common cap with a hole and stuffing-box as a guide for the upper end of the valve-stem; an arm and elbow is cast to this pipe, 5 inches in diameter, to which a copper pipe of the same diameter may be attached to carry off the waste steam. The valve ought to weigh about forty pounds, and be cast with a hollow at the top to receive lead to regulate the weight. The size of the valve might be 5½ inches in diameter, and 6 or 6½ high.



If it be made to weigh 45 pounds on a 4¾ inch opening, it will be about 2½ pounds to the inch. The stem of the valve should be wrought-iron; a screw should be cut on the top of the stem; there should be a small bail or handle to screw on it, so as to hook it up, and allow the steam a free passage when not in use. The lower pipe to the right hand, with a cock, is the supply-pipe from the heater to the force-pump 2½ inches diameter, placed within 4 inches of the bottom of the heater; the next above it is the scape-pipe from the cylinder to the heater, 5 inches in diameter. The next (or bent) pipe carries the steam from the heater to the stills; this should be 2½ inches in diameter, with a large cock affording the same vent. This pipe and cock will not answer with less vent than 2 inches in diameter. The next is an open wooden spout, from the top of the flake-stand to a pipe that descends into the heater; through this, there must be kept a constant stream of water to supply the engine. The pipe into the heater should be of copper, 2 inches in diameter, 87 inches long, descending within two inches of the bottom of the heater, with a cock in it to regulate the supply. At the top of this pipe there should be a kind of funnel 6 or 8 inches in diameter, in which a strainer ought to be placed; this funnel can have a lip that will let off any surplus water into a wooden spout, to be carried off. The bent-pipe to the left hand is the waste-pipe, to carry off any surplus water that may be let into the heater. This must descend (into the ground, if necessary) 87 inches, and rise again to the same level. It ought to be 2 inches in diameter, and be placed 7 inches from the bottom of the heater.

The principles upon which the machinery herein described operates, are as follow:

Water, and many other fluids, weigh 8 lbs. per gallon; the gallon contains 231 cubic inches; therefore a vessel containing water, or other fluids of equal weight, to the depth of 58 inches, will be about 2 lbs. to the inch. Hence, a valve placed on the heater of an engine, which weighs 2½ lbs. to the inch, will force steam from the body of the heater, through a pipe or tube to the bottom of such vessel and boil it. The quantity wanted can be regulated by a stop-cock, and the remainder will pass off through the valve.

In order to pass water into the heater of an engine under this press of steam, there must be a head raised of greater weight than the valve, say 87 inches high, which will be about 3 lbs. to the inch.

If a surplus of water be let into the heater, it can be carried off by a waste-pipe, which should descend 87 inches, and then rise to the same level; by this means a column of water will be preserved in the

pipe, which will prevent the steam from escaping, and, at the same time, let off any surplus water. The shape and size of machinery can be varied at pleasure, taking care to preserve the principles mentioned.

By this operation, there will be a *back lash* or counter pressure on the head of the piston, of say, 2½ lbs. to the inch. Several months experience, however, at the Richmond steam-mill, has proved, that this is more than over-balanced by the *additional* heat the water acquires in the heater, in consequence of the pressure of the steam. The water is thrown into the boilers of the engine in a *boiling* state. It therefore takes less fuel to drive a mill with stills, in this way, than it does to drive the mill without the stills in the usual way. The *power* required is trifling; it is the great body of *heat* contained in the scape-steam, that is brought into use by this invention.

In distilling with this weight of valve, care ought to be taken to have the depth of the beer in stills, and the depth of singlings in the doubler, added together, less than 58 inches. Some inches are frequently added to the depth by the condensation of steam, particularly in boiling cold charges at the commencement of the work. The quantity of beer made use of as a charge, ought to be kept as nearly the same, at every charge, as possible. A tube should be fixed in the vessel used as a heater, at the proper height to hold a charge, with a spout from it into the cistern where the beer pump stands, to carry back what may be pumped over the requisite quantity. It is also necessary to double at every charge, so as to keep the same *weight* in the stills at all times, or the running will not be regular.

In using the scape-steam, there is a complete system of balancing; the columns of water in the pipes at the heater are slightly kept in motion, swelling and sinking as they outweigh the valve; the valve may be said to float in steam, gently touching its seat, then rising at every new impulse; while the stills pour out a stream of condensed liquor with a *regularity* that can scarcely be surpassed by any thing in nature.

From the American Journal of Science and Arts.

Early History of the Salt Manufacture.—At the first settling of the Kenawha river, a large Buffalo lick was discovered on the N. E. side of the river, about six miles above the mouth of Elk river, and a short distance above the mouth of Campbell's creek, near the margin of the river at low water. Nearly opposite to the lick is a low gap in the ridge, through which the buffalo and deer passed on their way to the lick, in such numbers, that their paths up and down the creek were worn so deep, as to be visible at this day. For a considerable distance round the lick, not only the herbage but the foliage of the trees, as high as the animals could reach, was all eaten up by buffaloes, after they had drank of the salt water. If not disturbed by the hunters, they generally remained here two or three days. At this spot, several hollow logs, or "gums" were found, sunk into the gravel at the margin of the river, and probably placed there by the Indians, as they had every mark of great antiquity. In the same manner the early settlers sunk gums into the bed of the river, six or eight feet deep, in which was collected a very weak water, and from it they made a little salt for their own use. In the year 1794, Joseph Ruffner, of Shenandoah county, Va. bought a tract of five hundred and two acres, including the Buffalo lick; and in 1795, he moved his family on to the Kenawha. But little was done towards making salt, until the year 1807, when David and Joseph Ruffner, sons of Joseph, bought a tract of land a little above the Buffalo lick, and commenced their operations about one hundred yards above the lick, where there was no appearance of salt water. Having selected a "gum" or hollow sycamore trunk, about eighteen feet long, and three feet across the cavity, they, with great labor and difficulty, sunk it in the gravel and sand at the margin of the river, to the depth of fourteen feet, down to the smooth sandstone rock which forms the bed of the river, and is very uniformly found at this depth, up and down the river, as far as any gums have been sunk. The depth of the river, for ten miles above Elk, is uniformly about sixteen feet, and two hundred and fifty yards wide at low water mark; by which it appears that little, if any deposit is made in its bed by the floods from year to year. The lower part of the gravel through which the gum was sunk, for four or five feet, is very hard and tenacious, approaching that state, when gravel beds change into rock. When the gum was fairly settled on the rock, their next attempt was to sink a well or shaft into the rock, of sufficient depth

to afford a supply of water, but in this they were foiled, as they could devise no means by which to keep out the water from the river so as to go on with their work. At length, by putting a tight bottom of planks into the gum, and through a hole in the bottom inserting a tube three inches in diameter, into the rock below, no water could enter but what passed through the tube. Here the process of boring was commenced, by an auger or chizel, passed through the tube which bored a hole two and a half inches in diameter, the auger and rod, or pole, being fastened by a rope to a "sweep pole." When they commenced, they little expected to obtain a supply of water by merely boring a hole in the rock, having never heard of such an attempt before; but in this they were agreeably disappointed. In order to ascertain the quality of the water, they had frequently to stop and clear the hole not only of the water but of the borings. At seventen feet they struck a vein of salt water, the first indication of which was a bubbling or hissing of the gas in the hole. This water, though requiring three hundred gallons to make a bushel of salt, was then thought to be very good. The well was sunk to the depth of twenty-six feet, when they left off boring the first of October, 1807, and proceeded to the erection of a furnace, of about forty kettles, which went into operation the 11th of Feb, 1808, and made about twenty-five bushels of salt a day, which was then worth $2,00 per bushel. A small vein of fresh water that came in a few feet below the top of the well, they contrived to exclude by means of a wooden tube pushed down into the well, after reaming it out. From this example, has arisen the practice of pushing down tin or copper tubes, by the modern well borers, to any desirable depth. Not long after this, William Whitaker obtained salt water, and erected a furnace on the opposite side of the river; and about the same time a well was bored and a furnace erected at the old lick, and several improvements made both above and below this spot. The salt water in the gums, at this early day, usually rose about a foot above the surface of the river at low stages—at high stages, the water rose with that of the river, but not quite so high as it was in the river. The salt water was also increased in strength as well as in quantity by a rise in the river. When the wells were only twenty-six feet deep, they afforded water only for two furnaces; but when, in the second year, they were deepened to sixty and ninety feet, the water was sufficient to supply four furnaces of sixty kettles, holding thirty or forty gallons each, making from fifty to sixty bushels of salt every twenty-four hours. To prevent the river when high, from flowing into the gum, an additional one of eight or ten feet was set upon its top, and the water drawn out of it with a bucket and sweep by the hand. Soon after, pumps were used and worked by horses, one set of pumps raising sufficient to supply two furnaces, which was the usual number attached to each well. The furnaces were about fifty or sixty feet in length, with the same number of kettles set in two rows. The fuel then used was wood. Successive improvements continued to be made, both in the form of the furnaces and in the size and shape of the kettles, until the latter reached the capacity of one hundred and fifty or two hundred gallons each, weighing from seventeen to nineteen hundred pounds, requiring only five or six for a furnace.—These large kettles were used only for boilers, the smaller ones still being continued for "graining" or chrystallizing the salt. After coal came into use for useful, which was not until the adjacent hills were stripped of their wood, in the year 1819, broad pans of sheet iron were used for boilers. Capt. David Ruffner first introduced the use of coal, and his example was soon followed by the other manufacturers, who, at that time, had become numerous. He could adapt the form of the furnace and the pans to this new fuel. The pans were twelve or fourteen feet long, and three feet eight inches wide, and were placed in the front part of the furnace over the fire, for boilers. These being soon corroded and worn out, cast iron pans were substituted, made of separate pieces and fastened together with screws, the joints being tightened with a cement of cast iron borings. With care, these pans last a long time. The pans used at the present period are about twenty-five feet long and six and a half feet wide, and the length of the furnace from eighty to one hundred feet. The quantity of salt made at the time when they began to use the stone coal furnaces was from two hundred and fifty to three hundred bushels per week. As the furnaces were enlarged, and improved in their struc-

ture and management, the quantity increased, until, at the present time, they make in some instances, nine hundred or a thousand bushels per week. The salt water, as it comes from the wells, is very clear, and of the temperature of the coldest spring water. When it becomes even moderately warm, it begins to turn red, and when saturated by boiling, it is nearly of the color of blood. In this state, it is drawn off into a large trough, called the "brine trough," placed near the furnace, for the purpose of settling or clarifying. When cool, it becomes perfectly clear, and is then returned into the grainers, where it is boiled down into salt, and lifted out upon a platform, for the purpose of draining off the "bitter water," or muriate of lime, a very abundant and troublesome component in all the western salines. In the course of eight or ten days a red sediment, two or three inches in thickness, resembling red paint, forms in the bottom of the "brine trough." It is composed principally of a carbonate of iron, held in solution by the carbonic acid gas of the water, and set free on the application of heat, At this period a large portion of the furnaces have a small steam engine attached for the purpose of raising the water, which contains more salt the nearer they approach to the bottoms of the wells. The average quantity required to make a bushel of salt, is about seventy gallons. The total amount made in the year 1834, is estimated by the inspector at one million and a half bushels—a very great advance from the year 1807.

Within a few years, the manufacture of coarse salt* has been commenced, and large quantities are produced, equal in quality to the best Turks Island salt. After the water is evaporated to the state of strong brine and purified, it is drawn off into a long shallow vat, or cistern. and kept at a moderate temperature by the aid of steam, furnished by the boilers, and conducted the whole length of the cistern in a metallic or a wooden pipe. The salt is deposited slowly on the bottom of the vat, in beautiful four sided pyramidical crystals of great purity. It is removed once in eight days, and is then usually about a foot deep, all over the floor of the vat; some vats are several hundred feet in length, and ten or twelve feet in width.

* Strangely called alum salt.

The Kenawha salines present a most interesting and lively scene of activity and business. At intervals of every quarter of a mile, both shores of the river are lined with furnaces, sending forth dense curling volumes of coal smoke. The busy hum of voices, and the rattling of the "train wagons," along the Railways, with the bustle of the salt boats, and steamboats, to which the depth of the river affords a safe and pleasant navigation to the upper furnaces, give to this spot all the life and activity of a large city. The annexed "*view of the salines*," (see page 34 of the wood cuts,) with the outlines of the hills, will assist the reader in understanding both the geology and situation of this interesting spot.*

* I am indebted to Dr. Patrick J. C. M'Farland, Col. Donally, Mr. L. Ruffner, and Mr. Whi rker, for many valuable facts in the history of the "Kenawha valley."

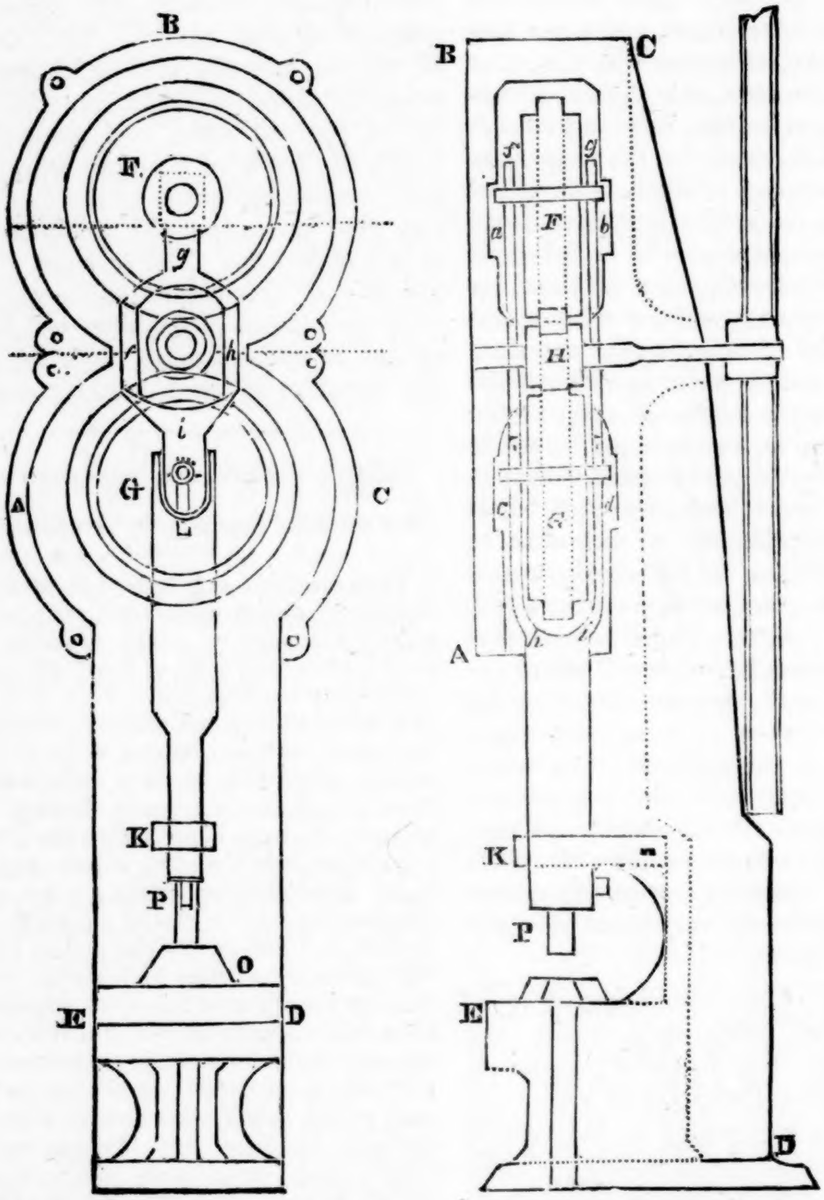
HOSKING'S PORTABLE PUNCHING PRESS.

(From the Third Report of the Cornwall Polytechnic Society.)

This machine is intended to facilitate the repairs of steam-packet boilers; it is sufficiently compact to admit of being readily conveyed to any dock or yard where its services may be required. Figs. 1 and 2, are two vertical sections through the centre of the press, at right angles to each other, in which A B C D E, is a substantial iron frame, cast in two parts, having a space between them to contain two slightly eccentric cog-wheels F and G, whose arbors work in the wrought iron frame *f g h i*, which is firmly connected with the punch P. These wheels are driven by the pinion H, which, like the wheels, may be said to consist of three parts; a central part containing the cogs, and two outside cylindrical portions, whose circumferences in each case coincide with the pitch lines; these, by rolling on each other, keep the cogs at a proper and uniform distance, and prevent the undue strain and irregularity of action which would otherwise attend the eccentricity of the wheels, and consequently vertical movement of their centres.

For the purpose of keeping the centres of the wheels in the same vertical plane with the centre of the punch, their arbors are continued into a groove cast in the framing, and shewn at *a b c d*, together with the guide *k*.

The action of this machine will now be readily understood. Motion being given to the fly-wheel, is communicated by the pinion of the wheels F G, which are so arranged that the longest working radius of one, and the shortest of the other, shall be in contact with the pinion at the same time; when the longest radius of the wheel G, is with the pinion, the punch will be at its greatest depression; and when this wheel has made half a revolution from that point, it will be at its greatest elevation The material to be punched should then be placed on the stand O, and at the next half revolution of G, the piece would be forced out.



It is obvious that this machine possesses many other advantages than its portability; and we are inclined to think that in connexion with the steam-engine, it would be found greatly superior to the screw-press generally used for this purpose.

The following report will be found interesting to many of our readers—and therefore we give it entire, with the proposed new organization of the department:—

THE SELECT COMMITTEE APPOINTED TO TAKE INTO CONSIDERATION THE STATE AND CONDITION OF THE PATENT OFFICE, AND THE LAWS RELATING TO THE ISSUING OF PATENTS FOR NEW AND USEFUL INVENTIONS AND DISCOV-

ERIES, SUBMIT THE FOLLOWING REPORT:

The promotion of the arts and the improvement of manufactures, are the objects aimed at in granting patents for inventions. All civilized nations have provided in some form for the encouragement of inventive genius. England, from whom we derived, originally, most of our notions of national polity, and who has hitherto been considered the "queen of arts," is in no small degree indebted for the distinction, to the liberality with which she has always rewarded genius and science for their inventions and discoveries. Individual munificence and the patronage of wealthy associations, have there, as in France and Germany, done much to supply whatever was wanting in the liberality of the Government. But such patronage is necessarily partial in its operation. It is limited to particular objects, if not to particular individuals. There appears to be no better way of measuring out appropriate rewards for useful inventions, than, by a general law, to secure to all descriptions of persons, without discrimination, the exclusive use and sale, for a given period, of the thing invented. In this way they will generally derive a just and appropriate encouragement proportioned to the value of their respective inventions. It is not at this day to be doubted that the evil of the temporary monopoly is greatly overbalanced by the good the community ultimately derives from its toleration.

The granting of exclusive privileges was in England originally assumed as a prerogative of the Crown, from which it derived a revenue. It was at first limited to the introduction of manufactures from other countries. Afterwards like privileges were granted for new inventions made within the realm. Like all other regal prerogatives, it was subject to abuse, and Parliament found it necessary to limit and restrain it. This was done by the famous statute of monopolies, passed in the reign of James I, which defined the King's prerogative in respect to the description of grants which might legally be made, and among them were patents for inventions and new manufactures. The very brief reservation of right in the Crown contained in that statute, and the judicial decisions in cases arising under the grants of privileges made pursuant to it, constituted the whole of the English law on the subject up to 1835, when a law was passed by Parliament giving the right to file a disclaimer in certain cases, and containing some other less material provisions.

It is from those judicial decisions that we have derived most of the principles on which our laws on the subject are founded, and which have entered into and influenced the judicial expositions given to them. But the decsions of our courts have been characterized by a more enlightened and liberal application of equitable principles to cases of this description, in a just endeavor to sustain patents for meritorious inventions, instead of seeking to find, in the technicalities of law, a pretext for setting them aside.

Prior to the adoption of the Federal constitution, the States, within their narrow limits, could give very little encouragement to inventors by grants of exclusive privileges; and up to that time the arts had made very little progress on this side of the Atlantic. By the constitution of the United States that power was wisely vested in Congress.

The first act of Congress on the subject was passed in 1790. It authorized the Secretary of State, Secretary of War and the Attorney General, or any two of them, on application, to grant patents for such new inventions and discoveries as they should deem "*sufficiently useful and important.*" Under that act the board so constituted exercised the power of refusing patents for want of novelty in the invention or of sufficient utility and importance.— This act extended the same privilege to aliens as to citizens. In 1793, it was repealed, and another act passed, authorizing patents to citizens of the United States only, to be granted by the Secretary of State, subject to the revision of the Attorney General. In 1800, the privilege to take out patents was extended to aliens who have resided two years in this country, and made oath of their intention of becoming citizens of the United States.

The act of 1793, which is still in force, gives, according to the practical construction it has received, no power to the Secretary to refuse a patent for want of either novelty or usefulness. The only inquiry is whether the terms and forms prescribed are

complied with. The granting of patents, therefore, is but a ministerial duty. Every one who makes application is entitled to receive a patent by paying the duty required, and making his application and specification in conformity with the law. The necessary consequence is, that patents have, under the act of 1793, been daily granted, without regard to the question of novelty, or even utility in the ordinary sense; for it has been settled that the term useful, as used in this statute, is only in contradistinction to hurtful, injurious, or pernicious. This construction (that no right is conferred to refuse a patent) has been given to the law by the Department charged with the duty of granting patents, not so much probably from any necessary and unavoidable import of the terms of it, as from a disinclination to exercise a power of so much importance, in cases where it is not clearly and distinctly granted. And it may be reasonably doubted whether it was the intention of Congress to confer such a power on the Secretary of State alone, since no provision is made for an appeal or other remedy for an incorrect decision adverse to the applicant. Besides, any person occupying that station might be supposed as little qualified by an acquaintance with the appropriate branches of science or of the arts, to decide such questions, as any other officer of the Government. And were he to undertake the task of such an examination as would be necessary to a decision in each case, he would have little time for other official duties.

Under the act referred to, the Department of State has been going on for more than forty years, issuing patents on every application, without any examination into the merit or novelty of the invention. And the evils which necessarily result from the law as it now exists, must continue to increase and multiply daily, till Congress shall put a stop to them. Some of them are as follows:

1. A considerable portion of all the patents granted are worthless and void, as conflicting with, and infringing upon one another, or upon public rights not subject to patent privileges; arising either from a want of due attention to the specifications of claim, or from the ignorance of the patentees of the state of the arts and manufactures, and of the inventions made in other countries, or even in our own.

2. The country becomes flooded with patent monopolies, embarrassing to bona fide patentees, whose rights are thus invaded on all sides; and not less embarrassing to the community generally, in the use of even the most common machinery and long-known improvements in the arts and common manufactures of the country.

3. Out of this interference and collision of patents and privileges, a great number of lawsuits arise, which are daily increasing in an alarming degree, onerous to the courts, ruinous to the parties, and injurious to society.

4. It opens the door to frauds, which have already become extensive and serious. It is represented to the committee that it is not uncommon for persons to copy patented machines in the model-room; and, having made some slight immaterial alterations, they apply in the next room for patents. There being no power given to refuse them, patents are issued of course. Thus prepared, they go forth on a retailing expedition, selling out their patent rights for States, counties, and townships, to those who have no means at hand of detecting the imposition, and who find, when it is too late, that they have purchased what the vendors had no right to sell, and which they obtain thereby no right to use. This speculation in patent rights has become a regular business, and several hundred thousand dollars, it is estimated, are paid annually for void patents, many of which are thus fraudulently obtained.

In this collision and interference of patents, the original and meritorious inventor sees his invention, to the perfection of which he has devoted much time and expense, pirated from him, and he must forego the reward which the law was intended to secure to him in the exclusive right it grants; or he must become involved in numerous and expensive lawsuits in distant and various sections of the country, to protect and confirm his rights. If he be wise, he will generally avoid the latter, and submit to the former alternative of injustice, to which the Government, as the law now is, makes itself accessary. The practice is scarcely less reprehensible, of taking out patents for what has been long in public

use, and what every one has therefore a right to use. The patentee in such cases being armed with the apparent authority of the Government, having the sanction of its highest officers the seal of state, scours the country, and by threats of prosecution, compels those who are found using the thing patented, to pay the patent price or commutation tribute. This exaction, unjust and iniquitous as it is, is usually submitted to.

The extent of the evils resulting from the unrestrained and promiscuous grants of privileges, may be imagined, when it is considered that there are now issued, since this year commenced, at the rate of more than a thousand a year; a considerable portion of which are doubtless void for want of originality in the inventions patented, either in whole or in some of the parts claimed as new.

A necessary consequence is, that patents even for new and meritorious inventions are so much depreciated in general estimation, that they are of but little value to the patentees, and the object of the patent laws, that of promoting the arts by encouragement, is in a great measure defeated.

To prevent these evils in future is the first and most desirable object of a revision and alteration of the existing laws on this subject. The most obvious, if not the only means of affecting it, appears to be to establish a check upon the granting of patents, allowing them to issue only for such inventions as are in fact new and entitled, by the merit of originality and utility, to be protected by law. The difficulty encountered in effecting this, is in determining what that check shall be; in whom the power to judge of inventions before granting a patent can safely be reposed, and how its exercise can be regulated and guarded, to prevent injustice through mistake of judgment or otherwise, by which honest and meritorious inventors might suffer wrong.

It is obvious that the power must, in the first instance, be exercised by the department charged with this branch of the public service. But as it may not be thought proper to intrust its final exercise to the department, it is deemed advisable to provide for an occasional tribunal to which an appeal may be taken. And as a further security against any possible injustice, it is thought proper to give the applicant in certain cases, where there may be an adverse party to contest his right, an opportunity to have the decision revised in a court of law.

The duty of examination and investigation necessary to a first decision at the Patent Office is an important one, and will call for the exercise and application of much scientific acquirement and knowleege of the existing state of the arts in all their branches, not only in our own, but in other countries. Such qualifications in the officers charged with the duty, will be the more necessary and desirable, because the information upon which a rejection is made at the office, will be available in the final decision. It becomes necessary, then, to give the Patent Office a new organization, and to secure to it a character altogether above a mere clerkship. The competency and efficiency of its officers should correspond with their responsibility, and with the nature and importance of the duties required of them. When the existing organization was adopted, the granting of patents was a matter of little importance, compared with with what it now is. The arts in this country were but little understood, and but little cultivated. Agriculture and commerce constituted our principal business. We had few manufactures, except those of a domestic character, adapted to ordinary domestic wants. Our work-shops were in Europe. Enterprise, in this country, ran in other channels. The war of 1812 gave it a new direction, and a new impulse, by creating an occasion for work-shops of our own. Necessity became the mother of invention, and American manufactures sprang into existence as by enchantment. Their rise and progress may be dated from that period; and a more rapid advancement in the arts, and a more astonishing development of human ingenuity, have never taken place in any other age or country. This remark will appear far from extravagant to every one who will take the trouble to examine the subject. This awakening of dormant genius to a practical and active existence, next to the arousing of the political and patriotic energies of the Union, was one of the great results of that contest.—It opened to the country a new era. The

nation entered upon a new existence. And since that period, American industry and enteprise, guided by American ingenuity and intellect, have achieved what would have taken Europe a century to accomplish. She has become all at once a manufacturing, as well as an agricultural and commercial nation. The useful arts have been cultivated with a success before unexampled, and have contribnted, in no small degree, to the wonderful improvements which have spread themselves over our whole country. Who can predict the results, even in a few years, of that spirit of enterprise which pervades the Union, when, aided by the Genius of Invention, and propelled onward by powers which she alone can bring into exercise? The very elements are submissive to her will, and all the endless combinations of mechanism are subservient to her purposes. She participates in almost every business and employment of man. Agriculture itself might as well dispense with fertility of soil, as with her aid in its cultivation.

The greatly increasing number of patents granted, affords some indication of the improvements which have been going on in the useful arts from year to year. The average number issued annually, from 1790 to 1800, was but 26; from 1800 to 1810, the average number was 91; from 1810 to 1820, it was 200; and, for the last ten years, the average number has been 535. During the last year, there were issued 776; and there have been granted in the first quarter of the present year 274, being more in three months than were issued in the whole of the first period of ten years. In the 22 years preceding the war of 1812, the average annual number was 73. The first quarter of the present year indicates an aggregate for the year, of 1,096; the amount of the duties on which, will be upwards of $32,000. The whole number issued at the Patent Office, under the laws of the United States, up to the 31st of March last, is 9,731. This is more than double the number which have been issued either in England or France, during the same period. In England for ten years preceding 1830, the average number of patents granted in one year was 145.

Whoever imagines that, because so many inventions and so many improvements in machinery have been made, there remains little else to be discovered, has but a feeble conception of the infinitude and vastness of mechanical powers, or of the unlimited reach of science.—Much as has been discovered, infinitely more remains unrevealed. The ingenuity of man is exploring a region without limits, and delving in a mine whose treasures are exhaustless. "Neither are all the mysteries of nature unfolded, nor the mind tired in the pursuit of them."

The first conceptions of ingenuity, like the first suggestions of science, are theories which require something of experiment and practical exemplification to perfect. Mechanical inventions are at first necessarily crude and incomplete.—Time is required to develope their imperfections and to make the improvements necessary to their adaption to practical uses. Inventors generally obtain patents before they venture upon those experiments which only can test their inventions. They are apprehensive of being forestalled in their discoveries, and see no other means of protecting themselves against piracy and fraud, than by securing patents at once.

A remedy for this may be easily had in a provision authorizing caveats to be filed in the office, giving security to the right of discovery for a time sufficient for making the necessary experiments, inquiries and improvements.

Heretofore aliens not resident in this country, have not been admitted to the privileges of our patent laws. But, as American citizens are allowed to take out patents in England and in other countries, a principle of reciprocity would seem to require that foreigners should have similar privileges here, on paying a similar duty or amount of fees that is exacted of our citizens abroad. The fees payable in England, on taking out a patent, amount to $585. If a patent be taken out for the three kingdoms of England, Ireland, and Scotland, they amount to $1,680.—In France they are $309; in Spain $292; Austria, $208.

A power in the Commissioner of the Patent Office to reject applications for want of novelty in the invention, it is believed, will have a most beneficial and salutary effect in relieving meritorious inventors, and the community generally,

from the serious evils growing out of the granting of patents for every thing indiscriminately, creating interfering claims, encouraging fraudulent speculators in patent rights, deluging the country with worthless monopolies, and laying the foundation for endless litigation.

In nineteen cases out of twenty, probably, the opinion of the Commissioner, accompanied by the information on which his decision is founded, will be acquiesced in. When unsatisfactory, the rights of the applicant will find ample protection in an appeal to a board of examiners, selected for their particular knowledge of the subject-matter of the invention in each case.

By this means, without danger to actual and honest inventors, the number of patents would be somewhat diminished. But there would be more confidence in those which should be granted, and as those which have been heretofore issued, should be daily expiring by their limitation, the community would begin to feel and realize the advantages of such a change. The present law waits till infringements and frauds are consummated —nay, it even aids them; and then it offers an inadequate remedy for the injury, by giving an action for damages. It ought, rather, by refusing to grant interfering patents, to render prosecutions unnecessary. Instead of sanctioning the wrong by granting the privilege to commit it, it should arrest injury and injustice at the threshold, and put an end to litigation before it begins.

Important and interesting as the Patent Office is now considered, it is believed that, under such new organization as is contemplated by the bill presented herewith, it will contribute largely to the great interests of the country, and bear no small part in elevating our national character. American ingenuity has obtained much consideration on the other side of the Atlantic. Even the manufactures of England are not a little indebted to it for some of their most valuable improvements. Her woollen manufactures, especially, have, within a few years, undergone an entire change, by the adoption of American inventions, by which wool has been made as yielding and submissive to the power of machinery as any material whatever. Cotton machinery has also been greatly improved in the hands of our mechanics; and while England receives from us three-fourths of the cotton she uses in raw material, we furnish her also with some of the most valuable improvements in the means of manufacturing it. Indeed, what

(To be Continued.)

CONTINUOUS STONE RAILROAD.

Sir,—The fact that railway companies have been compelled to increase their capital in consequence of the late rise in the price of iron, has directed attention to the possibility of finding a substitute. Experiments on a considerable scale, I am informed, are now making to determine whether stone cannot be advantageously employed for this purpose, at least in the vicinity of quarries, of the suitable kinds. It is proposed to lay a continuous stone floor for each rail, of 6 or 8 inches thick and 2 feet wide, shod with wrought iron rails by ¾ inch thick and 2½ inches wide. To hold the rails firmly down to the stone floors, it is suggested to use bolts 9 inches apart, with heads countersunk into the rail, and nuts on the under side of the stone.

It appears, sir, that by this plan a saving of one half, at least, of the weight of iron would be effected, and this on an article of *advancing* price is not a trifle. In many situations a floor, such as is described above, could be laid at 6d. or 7d. per running foot, and the bolts and nuts would not weigh more than the chairs, pins, keys, &c., of the present method.

Will it not prove a strong recommendation of the above plan, that the deflection will be materially lessened? Such appears to me to be the tendency of Professor Barlow's remarks quoted in your last. And will there not be some advantage also in the road being heavier than on the present plan?

It has been proposed to put a strip of felt or of thin wood between the stone and iron; I am inclined to concur in that advice; but I should like to know the opinion of others, whose experience may qualify them to give a more positive opinion than I can venture to offer.

In embanking, would it not, in many situations, facilitate the business, to carry on in advance of the earth-work a wall for each rail; or, still better, a wall wide enough for both, of the whole height of the embankment, cemented for a few courses at the top? The materials could, in many situations, be had almost as cheaply as earth, and are of such kind, and may be

used in such modes, as would allow the work to proceed at many points at once,—an advantage of no trifling moment in works of magnitude. Much, too, of the subsequent settling, so injurious both to the road and the carriages, would be avoided.

My principal reason for troubling you, sir, with these observations, is to request the attention of your correspondents to the project. Of the numerous mechanicians and engineers who will see them in your pages, there are doubtless some who can, and will, favor myself and the public with their opinions on the subject. If the plan is altogether impracticable for any reason whatever, it would certainly be performing a public service to prevent capital and attention being wasted upon it. If it be so capable of improqement as to have a chance of being brought into operation, it will probably much facilitate the adoption of that wonder-working invention—the railroad—to point out the errors of the foregoing suggestions, and the alterations necessary to success.

I am, Sir
Yours with great respect
A Promoter of Railways.

Feb. 9, 1836.

[Since receiving the above, we have been informed that a continuous stone railroad has been adopted, in several instances, in America. From the experiments there acquired, it appears that when the iron bands are laid immediately on the stone, considerable wear takes place; but that this is entirely prevented by interposing a strip of wood $1\frac{3}{4}$ inch thick. The plan of fastening, (in which much of the difficulty seems to lie,) is to insert a plug of wood in the stone, and drive home into it a square spike of such a size that its corners should touch the circumference of the hole in the stone. The dimensions of the iron band, proposed in the above letter, seem to be sufficient for a velocity of sixteen or twenty miles per hour; but on the New-Orleans and Nashville Railroad, (Mr. Ranney, the very intelligent chief engineer of which is now in this country,) it is intended to use a band 3 inches wide by 1 inch or $\frac{7}{8}$ths thick, and the tracks are to be $5\frac{1}{2}$ feet wide. This road is intended to bear a velocity of 60 miles per hour; and Mr. Stephenson has actually contracted to supply an engine, which will perform this with a load of 200 tons!—Ed. M. M.]

THE GUN MANUFACTURE OF BIRMINGHAM.

The Society of Gun-makers was incorporated in the 13th Charles I. (1638,) under the name of the Master, Wardens, and Society of Gun-makers of the City of London, from whose manufactories the Parliamentary forces in the Civil Wars were supplied with fire-arms. But soon after the Restoration, this branch of manufacture naturally found its way to Birmingham. It appears, that English manufactured fire-arms were not held in very high estimation in the early part of the reign of William III.; for it is said, that being heard, at one of his levees, to express much regret that he was obliged to import fire-arms from Holland, at much expense and with great difficulty, Sir Richard Newdigate, one of the Members of Parliament, for the County of Warwick, being present, opportunely recommended his Birmingham constituents to his Majesty's notice, as being fully competent, if duly patronized, to obviate the difficulty complained of. The King immediately despatched Sir Richard Newdigate into Warwickshire with an extensive order, and Birmingham has ever since been as famous for the manufactory of fire-arms as for all other ingenious productions. No adequate provision of fire-arms being made by the English Ordnance Department of the last century, the emergency of 1793 was, to an alarming degree, unprepared for. Lieutenant Colonel Miller was employed for a year or two, conveying orders to the different gun manufactories in Germany, to procure arms for the British forces. But the manufacture of fire-arms was subsequently carried to such an extent in England, that from 1805 to 1815, 3,079,120 gun barrels, and 2,935,787 locks, for the use of Government, were manufactured in Birmingham alone; of which, 1,827,889 were completed as muskets, carbines, &c. The supply was in general 30,000 stand of arms per month, or two in a minute! This number is exclusive of fire-arms manufactured there for the East India Company's service during the same period, to the number, as it has been calculated, of about 1,000,000: and exclusive, also, of trading guns, fowling pieces, &c. These facts are interesting, not only as regards the manufacturing capabilities of Birmingham, but as showing the amazing power of the British Government in having such a manufactory in the centre of the kingdom, from which supplies of arms can be distributed in all directions, for defence or annoyance, far exceeding in amount, as it appears by official returns, all the fire-arms manufactured in the chief manufactories of France, from the banks of the Rhine to the foot of the Pyrenees.—[From a very interesting article on Birmingham and its Manufactures, in the last Monthly Supplement of the Penny Magazine.]